

SINCLAIR

QL WORLD

Every month £1.25 December 1987

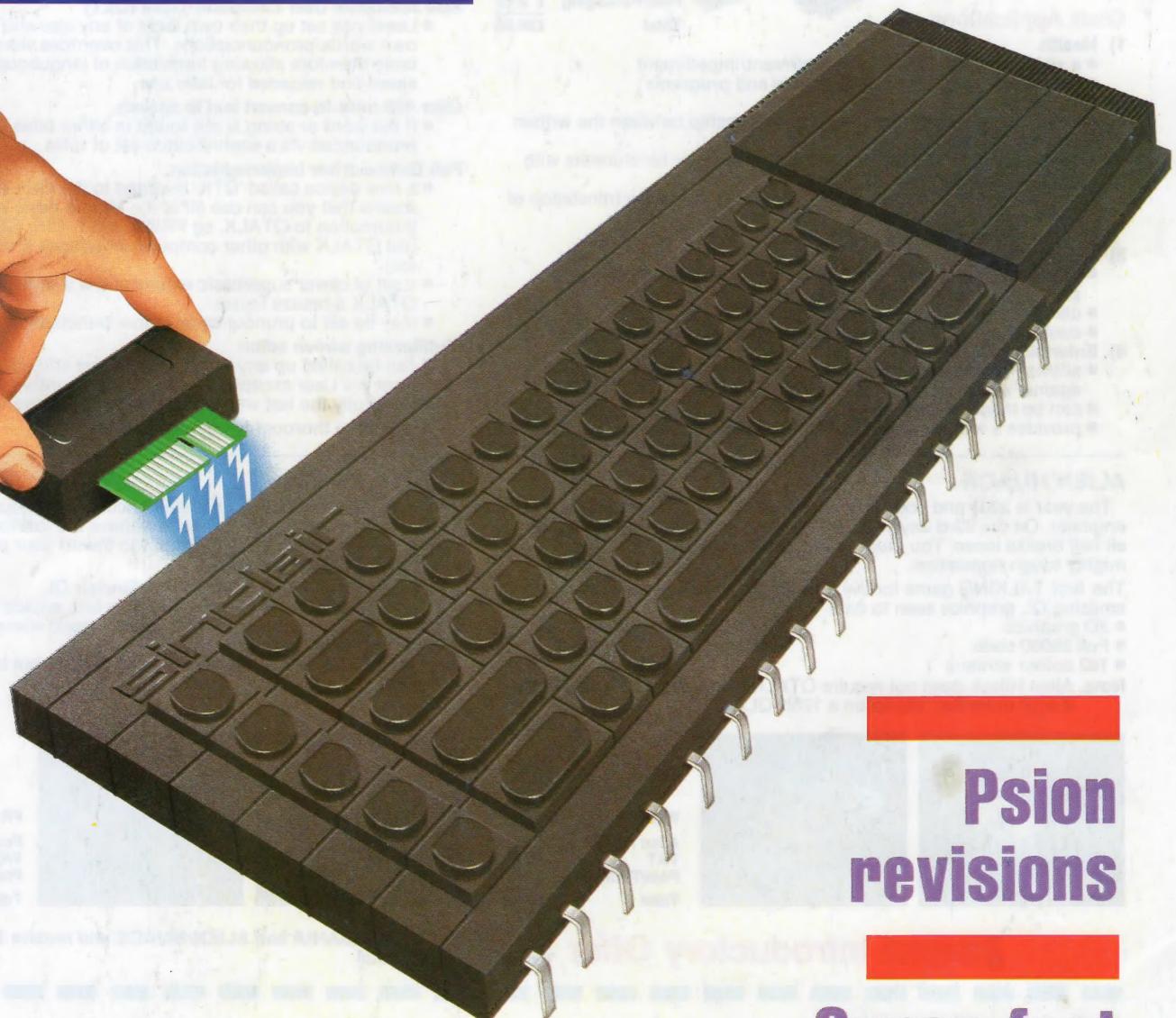
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The U.S.
connection



Psion
revisions

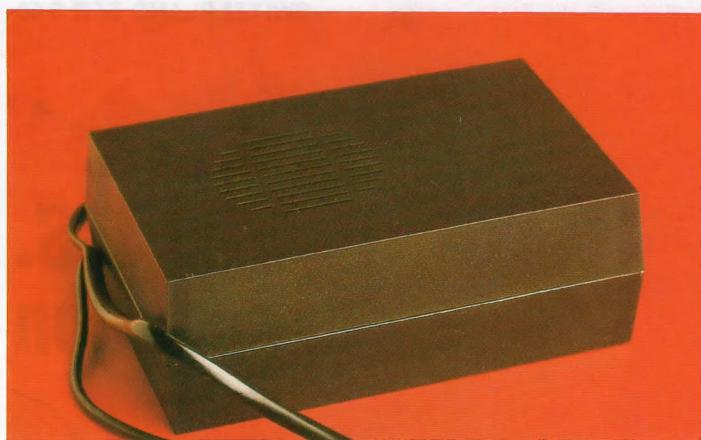
Super-fast
screen
handling

EPROMs
— the works

Introducing

QTALK

TEXT TO SPEECH
IN A
FLASH



Qtalk Applications

1) Health

- a viable solution to speech impairment/impediment
- allows the blind to write documents and programs

2) Education

- an excellent tool for teaching the relationship between the written and the spoken word
- a valuable aid to those assisting the dyslexic or for students with reading problems
- an amazing new method for teaching or learning the translation of one language to another
- touch typing made easy with keyboard echo

3) Industry

- enables verbal output of readings/warnings from independent peripherals. (BUS, IEEE, RS232 etc)
- can be used to give instructions to an operator
- could be set up as an answerphone or entryphone

4) Entertainment

- allows the user to verbally list programs while checking them against a hardcopy listing
- can be made to hum musical tunes
- provides a whole new dimension to computer games

PRICE	
Qtalk	£75.00
VAT	£11.25
Post/Packaging	£ 2.25
Total	£88.50

ALIEN HIJACK

The year is 2003 and you are working on the S.P.C. Forward, as ship's engineer. On the 23rd day you are attacked by an alien space ship and all hell breaks loose. You must regain control of your ship, against some mighty tough opposition.

The first TALKING game for the Sinclair QL. Possibly the most amazing QL graphics seen to date

- 3D graphics
- Full 68000 code
- 192 colour screens
- fast, dynamic, challenging
- talking hero and aliens

Note. Alien Hijack does not require QTALK to run but it certainly makes it a lot more fun. Works on a 128K QL.



PRICE	
Alien Hijack	£15.00
VAT	£ 2.25
Post/Packaging	£ 1.00
Total	£18.25

PUZZLE MANIA

Your mission, should you decide to accept, is to journey about the danger ridden cells of Maniaville to retrieve the lost loot of Lawless Lenny. Several obstacles will attempt to thwart your progress and only the smartest gamer will survive.

The second TALKING game for the Sinclair QL

- full 68000 code — 40 colour screens — fast, arcade action
- spoken clues to help you win (if you are good enough)
- Truly addictive challenge

Note. Puzzle Mania can operate without QTALK but is much more fun with it.



PRICE	
Puzzle Mania	£10.00
VAT	£ 1.50
Post/Packaging	£ 1.00
Total	£12.50

Special Introductory Offer

Buy QTALK, PUZZLE MANIA and ALIEN HIJACK and receive £5.00 discount pre VAT total

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QL WORLD

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WORLD — 1987

CONTENTS

■ ■ ■ DECEMBER 1987

7	QL SCENE • All the latest news
10	OPEN CHANNEL • QL mailbag selection
14	TROUBLE SHOOTER • Back solving consumer problems
17	EPROMS PROMINENT • How, what, why
22	PSION SELECTION • Which version is best for you?
27	QL EDUCATION • Teaching you to teach others
32	SOFTWARE FILE • Over the waves
34	U.S. CONNECTION • State of the art, Stateside
38	SUPER BASIC • Data, data everywhere
42	SPEEDSCREEN • Faster than a speeding bullet
50	FOCUS SALES POINT • New regular money savers
52	THE PROGS • Special Christmas machine code game
56	MICRODRIVE EXCHANGE • Bigger and better than ever

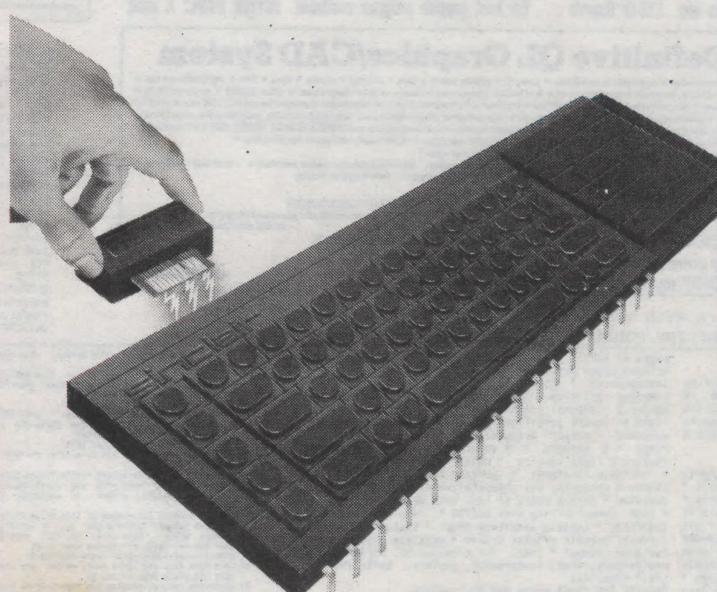
NEXT MONTH

BATTLE OF THE KEYBOARDS

After a long wait it looks as if the promise of a really good outboard keyboard for the QL will finally become reality – not once, but twice. Ron Massey reviews new keyboards from Schon and Sandy, and likes them both.

FLASHBACK

Sector Software has produced a new and user-friendly system for files independently of the conventional database format. Ron Massey finds that it has some of the advantages of a database and some of a text editor or wordprocessor.



THOR
COMPATIBLE

THE EDITOR is a word-, text-, character- and file-processing system characterised by massive power (see command list), very high speed (see speed benchmarks) and extreme flexibility and ease-of-use. EDITOR can handle text files, Quill files, programs in BASIC and other source languages, data files (it handles the entire character set 0-255), screens, machine code object files (even EDITOR itself) the lot. You have complete control over fonts and over all the system defaults we could think of via a comprehensive configurator (to give you an idea of just how comprehensive, not only can you set up defaults for 3 ink & 3 paper colours, screen mode, average line length, screen shape/size/position, character width/height, insert/overstrike, data/program default devices and names and dozens more mundane features, but you also have access to the settings for the EDITOR's definition of a word (ie: what constitutes a word delimiter), the column position at which scrolling to a fresh screen will occur, and so on). Needless to say, EDITOR is fully multitasking, and it is not uncommon for the more adventurous user to have 2,3,4,5,6 or more copies all running simultaneously, using varying screen positions (overlapping or distinct), shapes, colours or character sizes

to distinguish them. You can 'teach' Editor what you want it to do by means of command files (like macros, but much more flexible). Throughout, EDITOR's hallmark is absolute consistency of operation (which makes it very friendly, despite the daunting number of commands!) and its philosophy of placing YOU in the driving seat, leaving it up to YOU to decide how, where and in what sequence you should accomplish your objectives, and unlike Quill one of whose major failings was its pedantic way of imposing its preferred sequence on you.

There are two versions of EDITOR: V1.17 that will work on any QL (comes with a 90 page manual) and a SPECIAL EDITION EDITOR V2.05 with 40% more commands, much greater power, and an brand new (November 1987) extended manual (now 160 pages!) but which requires at least a 128K RAM expansion in order to run. Owners of the ordinary EDITOR who acquire a RAM expansion and wish to upgrade to the SPECIAL EDITION may do so for £25, including an exchange of manuals. The spelling checker SPELLBOUND has a 30000+ word dictionary, works with EDITOR and QUILL, and is available for £29.95.

If you want to buy a 512K expansion with plug-through connector, we'll supply one for £74.95.

EDITOR costs £29.95

SPECIAL EDITION EDITOR costs £49.95

Cursor Controls:	Move	Delete
Character : ← →	SHIFT/← →	CTRL/← →
Word : ALT/← →	ALT/← →	CTRL/SHIFT/ALT/← →
Line : ↑ ↓	CTRL/ALT/↑ ↓	CTRL/SHIFT/ALT/↑ ↓
Line : CTRL/↓	ENTER	CTRL/↓ (col 1)
Screen : SHIFT/↑ ↓	SHIFT/↑ ↓	
Scroll : ALT/↑ ↓	ALT/↑ ↓	
Screen page : SHIFT/ALT/↑ ↓	SHIFT/ALT/↑ ↓	Temp Margin
Start para : CTRL/ALT/↑ ↓	CTRL/ALT/↑ ↓	Left margin: ALT/TAB

F5 Text Characters may be entered in either Overstrike or Insert mode

SHIFT/F5 Force carriage return

F4 Screen may be redrawn

SHIFT/F4 Screen may be resized

F3 Command group may be specified and executed

SHIFT/F3 Last Command group may be edited and executed

F2 Command group may be re-executed

SHIFT/F2 Last Find or Exchange command may be edited and executed

CTRL/F2 Last Find or Exchange command may be re-executed

ESC Commands may be interrupted/halted

CTRL/C Multitask - no need for any external multitasker

Command format:

Commands may be entered singly or in groups, space or semicolon separated

A number may prefix any command or group - it is treated as a repeat count

A group is specified by enclosing the commands in brackets

Sequential files of commands (called command files) can be created and executed, as can individual lines

Command files can be called with up to 9 parameters with automatic substitution and programmable prompts

Command files may contain commentary lines (starting with fullstops)

File commands:

R Read text from device

RD Read document file

RU Read unformatted file

RC Read commands file

W Write text to device

WP Write text to printer

WR Write text to device

RW Write block to device

AF Append from device

Small Movement commands:

N Next line

P Prior line

CP Prior char right

CL One char left

CS Start of line

CE End of line

CB Start of Block

CK End of Block

CW Word right

CM Marker point

CP Start of parag

Big Movement commands:

T Top of file

B Bottom of file

L Last command point

GR Bottom of file

GC Go to char

GL Go to line

GP Go to page

GNS Go to soft page

GT Top of file

NL Next longer

NS Next shorter

Find/Exchange commands:

F Find string

E Exchange strings

Qualifiers...

B Search backwards

W Match string is word

Q Query before exchange

C Text Case significant

+ AND

- OR

< Begin

> End

Block commands:

BT Type

C = Character

K = Column

L = Line

BB Hide / Show

BS Mark start

BE Mark end

BI Insert after

RD Delete Block

BM Move Block

BW Write Block

Quit commands:

Q Quit without save

X Quit with save

Plus all the commands of SuperBASIC!

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THE EDITOR V2.05 / V1.17

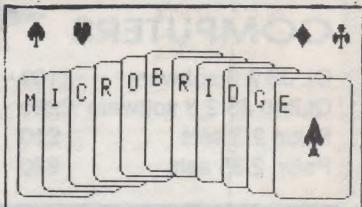
"Super... It exceeds feature specifications found in even the best word processors currently available... naturally overruling... you will actually look forward to using Editor than never happened with Quill!... you are in complete control... seldom have I ever come across a program which positively scintillates with such d'care and attention" ... QL World, January 1987

SPEED TESTS		
<i>*'-' means 'feature not supported'</i>		
STANDAR EDITOR		
Time Ratio	Time Ratio	Time Ratio
Load file (txfx) \$1	59.2 81%	997.4 100%
(Quill) \$2	17.5 100%	27.2 54%
(other) \$1	16.4 100%	-
Save file	46.1 100%	151.9 30%
Merge file	47.8 100%	160.0 13%
-----	-----	-----
Create 100 lines of 64 cols	7.1 100%	264.0 2%
Define 100 line block	1.5 100%	22.5 6%
Move block fwd by 200 lines	3.9 100%	311.1 1%
Copy block at bottom to top	4.9 100%	67.3 7%
Delete 100 lines	2.8 100%	205.6 1%
Page from top to bottom	12.1 100%	333.8 3%
-----	-----	-----
Find string - case dependent	12.3 100%	17.1 71%
Find string	32.1 100%	45.7 70%
Find 10th occurrence	19.0 100%	36.2 52%
Find 12th occurrence	0.3 100%	6.0 5%
Find string A or string B	34.5 100%	-
Find string A and string R	32.8 100%	-
Find backwards	32.3 100%	42.6 75%
Find string for a word	32.3 100%	-
-----	-----	-----

NEW PRINTER DRIVER AVAILABLE FROM 20TH NOVEMBER 1987

SUPPLIED FREE WITH BOTH EDITOR AND SPECIAL EDITOR

- Prints documents to ANY printer
- Can use ANY font feature of the printer
- Can support ANY NUMBER of "translates"
- Can support ANY translate convention
- Multiple line Headers and Footers
- Multiple occurrences of Headers and Footers in one document
- Wholly flexible pagenumbers
- Supports Bold and Underline on ALL printers
- Single sheet or Continuous stationery
- Print whole file or specified page range
- Pause printing prior to Head of page
- Abort printing at any time
- Compatible with all text files and Editor document files
- Sponjines
F1 Specify Default Device
F2 Specify Printer Device
F3 Select Printer Type
F4 Commander Printing
F5 Quit
Name
Introduces a new printer description set
Device. To which device is the printer connected
Baud rate. The speed at which the printer is set
to receive characters from the computer
Reset sequence. A control sequence which causes the
printer to reset to its internal defaults
Cancel sequence. Causes all data in the buffer to be lost
Preamble sequence to be sent to the printer at the
beginning of the document/fragment
Postamble sequence to be sent to the printer at the
end of the document/fragment
Header margin (number of lines) to be reserved at the
top of page. Any "page header" specified will occur
within these lines
Footer margin (number of lines) to be reserved at the
bottom of each page. Any "page footer" specified will
occur within these lines
Usable page length (number of lines). The amount of
space within which document text will be printed
Page numbering required
Column number for default page number
Reset page number (not page number). May occur anywhere
within a document, though typically at the start
Left margin (column number)
End of line code. Specifies the control sequence to be
sent at each end of line
Single Sheet printing required - pause at each page end
Pause code specifier
Conditional Text Break (number of lines). If the number of
usable lines remaining on the current page is less than
the specified number, a page break will occur
Page header text
Page footer text
Boldface is not supported by the printer. The program should
'synthesise' boldface
Simultaneous underline is not supported by the printer. The
program should 'synthesise' simultaneous underline
Exchange with Global effect
Exchange with Line effect
Toggle with Global effect
Toggle with Line effect



MICROBRIDGE A NEW DIGITAL PRECISION PROGRAM!

MICROBRIDGE is a superb Contract Bridge player and bidding tutor - you can use it either for entertainment or expert tuition, or for both together! Only a very elementary knowledge of the rules of Bridge is assumed (we can recommend you a good book if you do not know anything at all about the game) - the large and lucid A4 manual (equipped with comprehensive glossary) does the rest. The program is also aimed at strong Bridge players who want to refine their skills.

To use the system for entertainment only is simplicity itself. The computer automatically deals (dealer hand can rotate or be fixed) and assumes the role of both your partner as well as the opposition (if you have a human partner and a second QL, the two of you can play against the computer too). You will find that you and your partner will have the better cards between you, and it is up to the two of you to find a contract - you do your bit, the computer does its. The computer will comment on your bidding if you wish it to, clearly explaining why it agrees or disagrees with your bid, and what it thinks the best bid is (and why). Prepare to be astounded at the way in which the computer mimics the diagnostic thought processes of a very strong player in making its commentary. If you wish, the computer will explain the bids it makes for your partner too. Once bidding is over, you can either replay or review/change the bidding sequence if you wish - the computer will rethink responses and commentary from the changed bid onwards. This done, you will normally opt to play the hand - if partner was declarer you assume his position, its no fun being dummy! The computer will, of course, play the opposition, and will do its best to defeat the contractor. Good farewells as usual, 'Fair' means 'needs amplification' - virtually every Bridge program on the market besides MICROBRIDGE cheats. The two methods of cheating are (1) The computer knows the contents of all the hands and uses this information when bidding and playing - this results in extremely weird bids and card play; for example, the computer never loses a finesse! (2) The computer actually switches cards between the hidden hands during play, so you never win a finesse. In this way other Bridge programs disguise their poor bidding and absurd play needless to say, MICROBRIDGE never cheats in any way (it doesn't need to) - both during bidding and play, no information is used by the computer except the cards in the hand whose bid/play is being considered, the bidding/play so far, and (in the case of play) the visible dummy hand. This results in enjoyable and human-like bidding and play. In tutor mode, you can either choose between about 700 carefully selected deals, arranged in 16 thematic lessons, or generate a pseudo-random deal yourself. MICROBRIDGE is an ACOL player (Blackwood and Stayman and prepared bids too) of strong club player standard, and will ask you your bid on your hand, and tell you whether or not it agrees, and why (the 'why' occupying upto 10 sentences of detailed reasoning). End of this short stinting). If it disagrees, you have the option of insisting on a bid or accepting MICROBRIDGE's advice. In both cases, MICROBRIDGE resumes bidding the hidden hand (you can opt to see it - and yes, you can be tutored/tested on that hand too). When the final contract is reached you have the option of playing as declarer, as before. There are many other features too, including the ability to generate ultra-strong hands for practice at bidding and playing slam or near-slam contracts, and to return to a deal at any time via a code. MICROBRIDGE is unique, and great fun, and very educational too. You will need at least 256K RAM expansion to run it, as well as a disk drive.

MICROBRIDGE costs just £34.95 - incredible value!

"Incorporates new ideas of real value"
THE TIMES HIGHER EDUCATION SUPPLEMENT

The Power Behind The Button

If you have not received a copy of our 57 page product brochure as yet, please write to us asking for one and we will ship it to you free. It contains details of an exciting prize draw too!

Digital Precision always pays attention to feedback and suggestions from our customers: many of the program upgrades detailed in this ad have resulted from these! For example, the very latest SPECIAL EDITOR (v2.05) has an instantly updated word count and a full-featured 'document mode' (with visible, fixed and auto paging etc) for those who wanted it to more closely resemble a conventional word processor. We do this without reducing its speed or flexibility as a development tool. In response to Brian Tonade's request in QUANTA, all EDITORs are now supplied with an even better printer driver, which allows (among many other things) page numbers anywhere, with any message, in any style, as well as variable headers/footers thro' a document! With TURBO v2.0 you get full DRAM/TOOLKIT/THOR compatibility, and for those who wish to use it on not so well-written source code, a more tolerant 'FREESTYLE' mode (Rosenthal & Borman in QUANTA). Ta!

DIGITAL PRECISION

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QL SCENE

Bigger and better

With the multitude of toolkit programs from which to choose, it is scarcely surprising that QL owners are in a quandary. Further, it is always the case that whichever toolkit is chosen it is certain to lack that vital command just when you need it.

Compware hopes to solve the problem with the release of *Mega-Toolbox*, containing more than 160 new commands, aimed specifically at SuperBasic programmers. Mega-Toolbox commands are claimed to be largely original, complementing presently-available toolkits. The toolbox is compatible with QL SuperBasic compilers and customised versions will be available for use by software houses in their programs.

Mega-Toolbox commands include improved command line editing, job control/memory allocation commands, tune-playing jobs, alarm clocks, copying/mirroring/zooming/saving/restoring windows, a multi-tasking print command for rolling demonstrations/slide shows, 3D text printing, screen swapping, pipes, keyboard control, memory copying and fill.

The price is £29.95 including P&P. For further information contact Compware, 57 Repton Drive, Haslington, Crewe CW1 1SA.

A speech synthesiser has recently been launched for the QL. *Qtalk* has 16 levels of programmable pitch and more than 400 rules to convert text to speech. It includes an exception

dictionary of the most common 25,000 words and the user may define his own exception table which may be saved to disc or Microdrive.

Qtalk is configured as a standard output device, al-

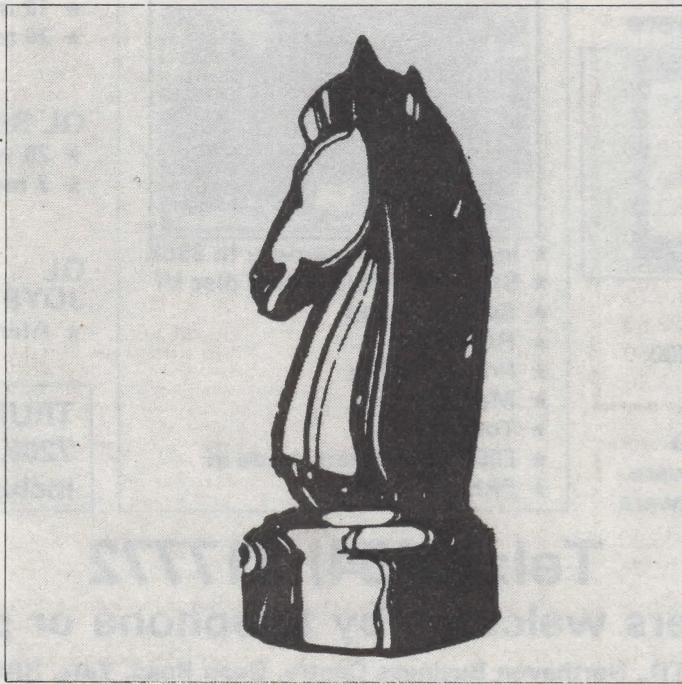
lowing files can be listed and copied to it and making it very easy to use. In addition to its obvious uses in talking programs, it can also handle Quill and Editor files.

The software requires approximately 20K of RAM, so it will work satisfactorily on a standard machine, though anybody using *Qtalk* and *Quill* simultaneously could experience memory problems.

Two games have been released using *Qtalk*, though they also operate without speech. *Alien Hijack* is a 3D arcade adventure, along the lines of the Ultimate Knight Lore-type games for the Sinclair Spectrum. The second game, *Puzzle Mania*, is a 40-screen levels-and-ladders arcade game. *Qtalk* costs £88.50 including P&P. *Alien Hijack* is £18.25 and *Puzzle mania* £12.50.

Qtalk is available from Chi-Soft, 20 Chandos Way, Welgarth Road, Hampstead, London NW11 7HF. The system is produced by Maxtronics R&D Ltd, 26a Conway Street, Christchurch 2, New Zealand.

Chess champion



Psion Chess has been in battle again, adding two new world titles, World Microcomputer Software for Chess and World Personal Computer Chess Champion.

The first tournament was staged in Rome by the International Computer Chess Association, with each of the seven programs playing each other. To gain the title, *Psion Chess* dropped only half a point in the six games, beating much more powerful machines to emerge as winner.

Personalising service

The Appointments/Sales Chasing/Follow-up Diary is now available with a special service from PDQL. If returned within 28 days from despatch, PDQL will personalise the program to suit the customer's stated requirements.

The program needs extended memory and is an

Archive/DEV application. It is designed to fix appointments, itemise pre-appointment duties, to help chase existing clients/customers and to set out future duties.

The package costs £48. For further information contact PDQL, Unit 1, Heaton House, Camden Street, Birmingham B1 3BZ.

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- ★ Includes 80 column software
- ★ Not BT approved

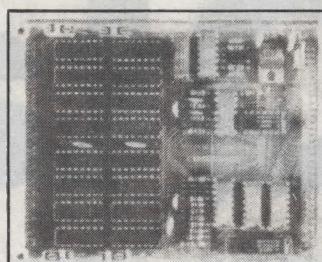
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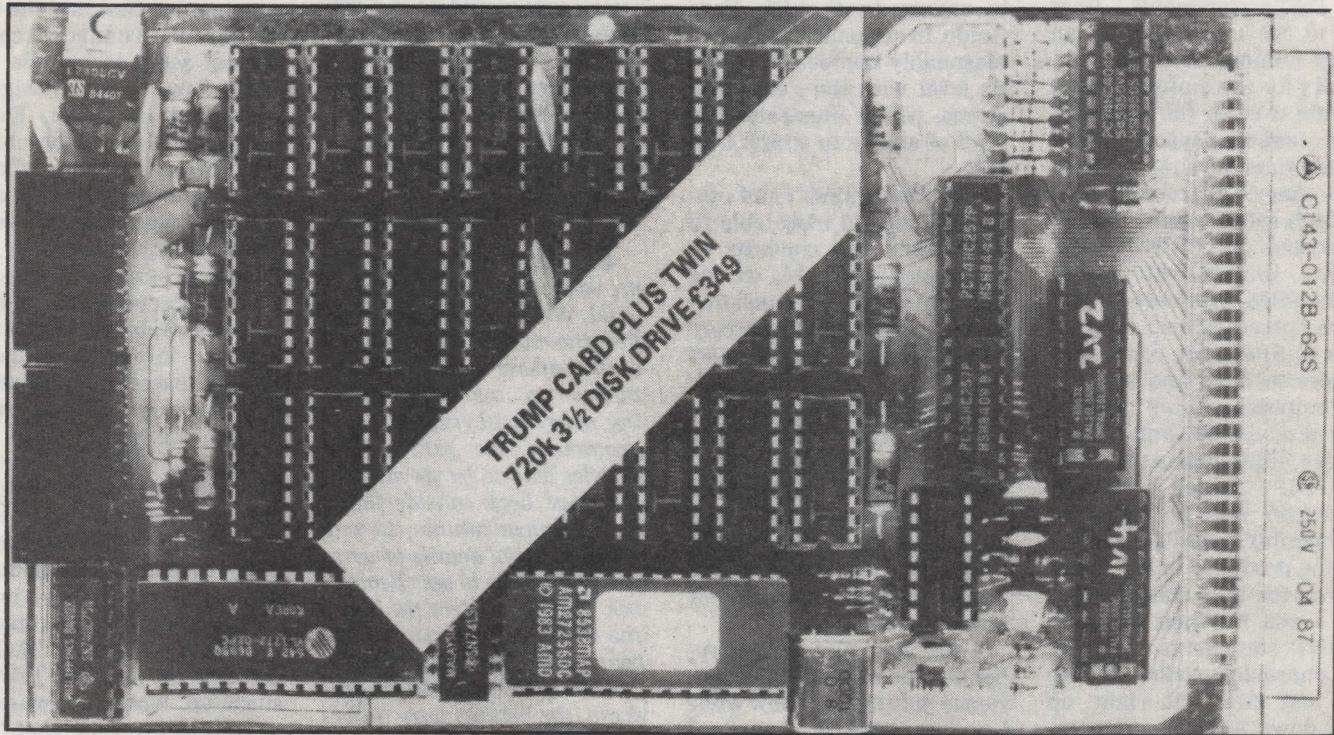
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Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

OPEN

Gigo

I would like to warn anybody who tries to type in the *QL Convertor/Calculator* program October, 1987. It can be difficult to determine from listings the validity of certain characters and the exact number of spaces in some statements, which can make all the difference to whether or not a program runs.

In this instance, some of the DATA statements – lines 152 to 162 – must contain an exact number of spaces, necessary for the multiple string slicing used in the program. The number of spaces needed is 12 minus the sum of the alphanumeric characters within each set of quotes. Spaces indicated in PRINT statements – lines 12 to 31 – should be handled with care to produce correct screen data. In line 6, SP\$ must contain 15 spaces, as must line 50.

Computer/printer listings can produce unwanted characters, either due to the printer DIP switch settings, character sets or other incompatibility problems. The listing produced in *QL World* shows the four characters «, =, » and ?. When found in PRINT statements they are the characters coded 188, 189, 190 and 191 – left, right, up and down arrows on-screen. To get them you will have to use the CTRL key. See the character set codes in the QL manual for more information.

E Bamber, Glasgow.

What could they mean?

Having taken *QL World* for more than two years, I am at last moved to make a plea for those who are relative novices to the computer world and to mention the comprehension problems we

have until we can develop our individual education in this sphere.

I bought my *QL et al* in September, 1985 and have since been a self-taught student of the art. I have, led mainly by good advice gleaned from *QL World*, bought a dozen of the excellent Bradbeer, Glentop and Blueprint books and have joined the Eidersoft Support Service. They have proved invaluable; as a consequence I may even be ready to return to the *QL User Guide*. In summary, I am now reasonably competent at basic level with the Psion programs, which illustrates the level of ability to which I al-

I feel that unless I and others like me am more able to understand the contents of my favourite monthly we are unlikely to proceed much further. I understood scarcely anything in the August, 1987 issue.

I appreciate that you must cater for the majority but could not some section be introduced which could lead and encourage the less knowledgeable? The main difficulty, I believe, is in the necessary use of jargon and abbreviations.

A few examples of comprehension blocks which I experience may help to show what I mean. What is a toolkit? They are constantly being written about and I have no clue what they do. Similarly, what is a compiler, and Editor? Nobody explains this to the novice. What are the programs which are written about in Utility File? The technical man may understand why one might buy QL Turbo + Quill or QLOAD but I cannot.

Turning to pages 50 and 51 of the August, 1987 issue, Watch the saves and Avoid horrible risks. The language seems simple, the articles helpful enough, but what was

the problem and what are the additional translate facilities mentioned in the second piece? Finally, on page 56 Mail Merge which/what are listings one, two and three?

I hope you take my observations seriously as I wish to be able to glean assistance and valuable advice from your pages but truly find a technological barrier. I do not think it would be fair to suggest that the technical articles should be reduced to basics; you would need a 200 page booklet each month and would lose many disenchanted readers. I would suggest either editorial clarification or a section each month which would seek to edify the uninitiated.

J H Witherow.

● *Editor's Reply: I appreciate your problem. The content of QL World is designed to reflect the market and the wishes of readers. Being a rather introverted market containing many hobbyists and programmers, the jargon and articles tend to be specialised. We have been considering a less technical column, so how about sending details of what you would like to see? Remember, the more letters the better the chance of the column appearing in the form you want.*

As to the Mail Merge program, the listings were unfortunately not labelled as they should have been. Listing one is the Mail Merge program. It is followed by listing two, the Labeller, starting at line 100 at the bottom of page 56. Finally, the example listing three starts at line 1 in the second column on page 57.

Lack of design

About one year ago we bought Xchange to run on IBM PCs. We had previously been using the Psion programs supplied with the QL

and had decided to take advantage of the additional facilities provided by the complete PC version. It was also hoped that the large number of PC users would provide us with a greater number of prospective clients who would be looking for specialist or tailored systems which we could develop using Archive, among other options.

Happily for us that proved to be the case but we were disappointed to find that the full version of Xchange Archive did not seem to include the printed page forms designer advertised by Psion. Exact wording in users' brochure was "Form Designer allows users to design screen and printed page; format comprises background form for input and output".

We contacted Psion and received a reply stating: "I am sorry to inform you that a 'printed pageforms designer' does not exist. The only way to generate reports is by using the LPRINT command". The fact that this facility did not exist proved annoying but it was possible to continue developing report modules using the slower and more awkward LPRINT command.

I have recently flicked through the August, 1987 issue of *QL World* and was disconcerted to find that the misrepresentation initiated by Psion in 1984 is still in evidence. The advertisement on page 39 states, regarding Xchange Archive "... multifile indices provide fast access and a form designer for screen and printed input and output".

I would be interested to hear of readers' comments regarding this or similar occurrences within the micro-computer field.

Neil Cresswell,
Bespoke Systems
Software,
Rainham.

CHANNEL

Impressive

I have owned a QL for around six months. I bought mine when Dixons was selling them for less than £100. Mine cost £70 because of the absence of a manual and I must admit to being most impressed with the system as a whole.

As a lecturer in computer studies, I spend a great deal of time with the more run-of-the-mill business systems like IBM and, believe me, they do not come much more run-of-the-mill than the PC. My business system is about the best of the bunch for that era of the PC in terms of enhanced features and is the ACT Sirius 1. Why industry has stayed with the old, outdated IBM concept so long is an historical rather than logical matter and goes some way towards explaining the QL's lack of success.

I read an interview where in Sir Clive Sinclair was questioned about the QL's comparative failure. His excuse that the QL was too much too soon struck me as being both patronising and largely incorrect. Certainly it was not sufficient reason for Sinclair to go back to the ancient Z-80 running the even more ancient CPM, lap-top or not.

The QL never had a chance of repeating the success of the Spectrum. I believe that Sinclair misjudged the market badly. He must have reasoned that the mass market, having been exposed to the wonders of computing, was ready to do something sensible with the power rather than continue zapping the same old aliens in admittedly varied formats.

Had he looked carefully at the business market he would have seen that even business systems had then, and have now, the same kind

of juvenile software available. As a scientist and innovator the man is a genius; as a marketing man he did not appear to be in Alan Sugar's class.

I have yet to see the equal of the QL as a design concept. As a usable tool it shares a similar problem to the Spectrum and ZX machines - poor keyboard - but the goods inside the machine are far from poor. As a newcomer to the QL I can appreciate its merits by comparing it to the new designs. Qdos makes MS-DOS and CPM look decidedly dated.

I still marvel at the computer press making so much of the Sinclair decision to use 8-bit RAM for a 16-bit processor. The reviews were probably written on a machine which had been using the same design concept for some time with no adverse reaction - the IBM PC. The furious press condemnation of the Microdrives as unworkable reminded me so much of the adversity which has beset all scientists since they committed heresy by declaring the world to be round.

John Masterman,
Hartlepool

U.S. Viewpoint

I am a subscriber through a dealer/agent, Sharp's Inc of Mechanicsville, VA, U.S.A. I wanted to commend you on the magazine, its content and quality. As you may know, the U.S. version of the QL had just reached our shores and completed FCC tests to be marketed when Sinclair sold to Amstrad. A+ Computer Response in New Hampshire acquired all the stocks and has been selling them through a limited group of mail order dealers.

The only national QL exposure, except for Timex-Sinclair User Group newsletters, has been in some one-man -

LONG LIVE THE



produced magazines. They include *Time Designs* magazine, *Quantum Levels*, *CTM* - formerly Computer Trader Magazine - and two others. With the possible exception of CTM, none would be found on a news stand. As you may have gathered *QL World* and the Quanta User Group magazine are both very welcome in the U.S. for famished QL owners.

Keep up the good work and do not stop publishing programs listings to type in, as this is the only way to learn SuperBasic by example.

Bob Howard, U.S.A.

Paper policy

I was surprised to read in the August, 1987 issue of *QL World* that you were advising QL users seeking thermal paper for the Serial 8056 printer to try Dixons. Recently I visited various branches of Dixons in Manchester and Wigan in my quest for paper. The reply at all branches that they were out of stock and were unlikely to re-stock.

The sales staff displayed a generally disinterested attitude and did not seem perturbed by the fact that a printer without paper is not much use. I was somewhat perplexed by this in view of

your advice. Perhaps Dixons has different regional stock ordering policies?

I am finding thermal paper very difficult to obtain in this part of the country and have tried most of the major department and electrical stores in Manchester, Blackpool, Wigan and Bolton areas. My usual source of supply is Boots the Chemists but it presently out of stock in this area. The larger branches have until recently stocked Brother thermal paper in both roll and pre-cut A4 sizes.

A4 roll is slightly too narrow for the 8056 but can be adapted by the simple means of cutting the ends of the central spindle of a used roll and glueing them to the ends of the central spindle of the new roll. Once the paper has been adapted to fit the printer there seem to be no problems when using the narrower A4 size with Quill, Abacus and Archive.

The quality of the 8056 varies greatly, depending on the quality of paper used. The Brother paper is the best I have found. Dixons paper does not tend to do justice to the printer, the quality and sharpness of the type being highly erratic and occasionally no print appears at all.

Gareth Boote, Wigan.

FILE DUMP ASCII/HEX



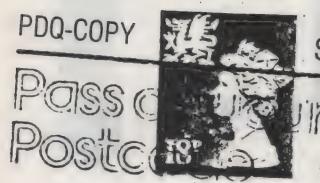
COMPARE



PDQ-XREF



PDQ-COPY



SEIT

MAILMERGE de LUXE



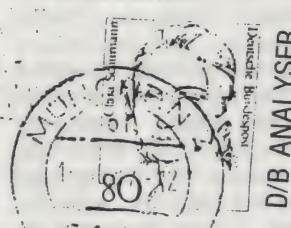
ARCHIVE TUTOR



RECOVER



FILEBOUND

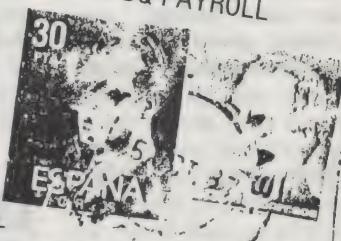


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PDQ-PAYROLL



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A



R O U B L E

P

R

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B

L

Many users may have little idea of what is involved in dealing with letters and telephone calls. *QL World* has several regular features answering letters and the time spent is comparable with that required to assemble the magazine as a whole. For that reason it has been necessary to advise telephone callers that only letter enquiries can be entertained.

Only a selection of letters can be answered; where a letter highlights a problem which may interest many readers it is worth printing a response but an obscure enquiry is unlikely to be dealt with, in general. Remember that virtually all enquiries received should have been directed elsewhere in the first instance – the problems were not created by the magazine – but we do our best to answer queries on behalf of suppliers, software writers and hardware manufacturers. Enclosing a SAE if a reply by letter is desired helps keep down costs and allows more enquiries to be dealt with.

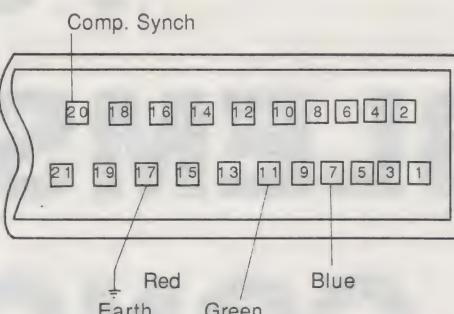
High prices

Have any overseas readers found that their local shops are charging high prices for software produced in the U.K.? The question was prompted by a call from a supplier who had been told that the price paid for a program at one shop in the Netherlands was about 70 percent higher than the U.K. price. A shop buying even small quantities from a supplier would get some discount and the shop in this case might have been marking up the price paid by about 100 percent.

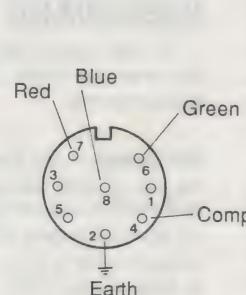
As the shop concerned had not ordered the program from the original supplier there is also the question of whether or not the copies being sold had been pirated, in which case the buyer might have difficulty in getting upgrades.

There has been an upgrade of the ROM in the Thor 1 to version 4.21, which allows programs using the Keyrow function to work. For those having version 4.10 ROM the same result can be obtained from a 4.21

Figure 1



Prism connector, seen from the outside



QL connector, seen from the outside

Figure 3

Connector pins (PCB wiring)

B T	D
1	1
2	2
3	3
4	4
5	5
6	9

Equivalent connections for
SER1 port on Samsung
machines with "D"
connectors

systems disc. These items are obtainable from CST. There is no guarantee that all such programs will now work. **M. I. Jackman** reports being able to use *Sign Designer* now but is still having difficulty with *QL Peintre* and *GrahiQL*. Can **Pyramide** and **Talent** offer any suggestions?

Problems with the Thor should be addressed directly to CST but do not expect the company to deal with all

matters which concern just Eidersoft software. CST will be handling selling the Thor now for the most part; it sells through other suppliers but they are not the usual *QL* outlets.

Peter Tyler writes to say he has had six or seven once-used cartridges which have proved to be bad. Most were identified by a Psion version 1.0 program name. Cartridges made in the early days of the *QL* did not seem to meet the same quality standard as those made for version 2 software and it is no surprise to learn his comments. The lack of comment from other readers suggests there is no great difficulty with cartridges. Perhaps the price seems so low that a few rejects do not worry most people?

No-one has offered a circuit diagram yet for the Samsung Seri D connector and I have had to explore the serial port connections the hard way. Figure 3 shows a comparison between the BT and D sockets used on the *QL* PCB for the Seri port. As all the wires go to the same pin numbers, except for one. I had doubts about pin 6/9 but that was the way I found it on my machine.

Howard Clase of Newfoundland advises that he has found the wiring to pins 1-6 is the same for both BT and D, so be careful before making the one connection. The only difference of which I know between his *QL* and mine is that his is presumably a U.S. market version, whereas mine was made for Germany.

In case there are any users with two *QL*s networked with a printer attached to the slave, the way to print from Editor or Quill in *QL1* is to alter the Print and Printer data files respectively and insert the relevant network designation of the *QL* with the printer attached to it, e.g., n2 Seri.

Both files can be altered easily after they have been read into Editor alternatively, Printer data can be altered by running the Install base routine and taking the non-standard port option, then inserting the network designation for the printer. Do not forget to key-in FSERVE on *QL2* if you are using Toolkit II, I use TK2 in both machines but printing via the slave

SHOOTER

E M S O L V E D

may still be possible with just the basic QL network commands.

Any offers

R. Mueller of Pietersburg, South Africa asks for programming hints, perhaps programs for *QSound/QPrint*. Any offers?

There are occasionally references in readers' letters to cartridges becoming corrupted by magnetic fields encountered during the mailing process. It appears to me that the readers are usually making an incorrect assumption; it is more likely the corruption is due to bad copying of files in the first place, or to faulty Microdrives or actions of the user.

Mueller sent copies of letters received from both U.K. and S.A. post offices, following problems he had with cartridges received from the U.K. and the responses were somewhat different.

The S.A. office said that it was unaware of equipment used by it causing problems with recorded tapes or discs; the U.K. office stated that "erasure... due to... magnetic fields... is not uncommon".

The U.K. office also stated that it is not aware of any equipment used by it, by airlines or Customs which would cause such damage. It advised sending cartridges "in a container designed specifically to shield its contents from strong magnetic fields". Cartridge and cassette manufacturers should be able to supply details of such containers.

In practice

When such items are despatched they should be identified as computer records or computer software. In practice, I cannot see suppliers going to the expense of using special packages, because buyers would not be keen to pay the extra cost, and because the proportion of cartridges returned due to suspected corruption by magnetic fields must be extremely low. It needs to be a fairly strong magnetic field to cause corruption but long-term exposure to a medium field e.g., leaving a cartridge close to a TV set or transformer, might cause trouble.

Chromagraphica. A reader has written providing the names and addresses of two people to whom he says complaints can be addressed. Anyone with an outstanding complaint against the company which they wish to pursue should send a SAE for details. The Chroma display is said to be basically a Microvitec unit.

Printerland. Details of this company, its position, and the address of a director have been sent to me. If you wish to pursue complaints with the company and require the information, please send me a SAE. We cannot vouch for the accuracy of the information but it seems reasonable.

Byteback. Another complaint has been received and no response has been received to any of the four complaints letters passed to the company. **W.D. Software** and **Xenon** have not responded to the single complaint letters sent to them, nor to reminders.

Eidersoft. The company has been split into two operations, one handling QL supplies, the other Atari and such. Do not contact Eidersoft Ltd on QL matters as the company is the one dealing with the Atari. The company for QL users is called **Eidersoft-QL**; the address and telephone number are given at the end. Inevitably, the change in management and personnel will mean that there may be delays in dealing with some matters and you are asked to be patient while the Eidersoft stock and administration is set up anew.

Good reputation

It is expected that most of the Eidersoft range of products will still be available. The people now handling this range have a good reputation for dealing with customers and they have been on the QL scene since the early days.

Microdeal reports having sent a replacement copy of *Land of Havoc* to **R. Mueller** in South Africa but is now sending another in case the first was lost on the way. It apologises to the customer for any inconvenience.

Disc drive repairs. If you send drive(s) to be repaired by **Akhter** it is

likely to be returned set up as Drive 0 regardless of what it was when you sent it for repair. It is apparently standard practice to set all movable jumpers to the positions specified in the manufacturer's test procedure. That cost **P. Edwards** about £60 as he tried to find a non-existent fault in his returned drive by first replacing the interface, then taking the drive to another repairer, who noticed the incorrect drive setting.

Prism QL14 Monitor. **W. Newell** obtained a suitable lead for connecting this display to the QL from **Care Electronics** for £10.35. The lead is called RGB 8-pin to SCART (Euro). The display worked correctly with this lead. The instructions with the Prism are apparently sketchy but if **M. H. Mottram** would like a copy, he should send a SAE to me, for forwarding to Newell.

D. Redpath, G. M. Young and A. V. Williams sent details of the connections required - see figures 1 and 2. Thanks to the readers for the help. Both sketches show the sockets which are attached to the devices, as viewed from outside. As there were differences between the drawings sent to me, further comments on the wiring would be welcome.

Wire colours

The colours given are for the screen display, not for the sheathing of the wire used. If you have a standard Sinclair cable with 8-pin plug at the QL end and bare wires at the other, use the relationships between wire colours and pins given in figure two. The Prism was apparently based on the Fidelity ZX3000 chassis.

Suppliers

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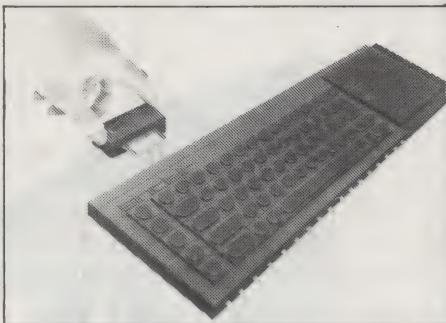
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This advertisement was designed, and printed using Front Page Extras 2. Most of the character sets are available in the program as bought. The advert was printed using an MP165 printer. (Only £238 inc QL interface, VAT, p&p)

The Front Page series and Office Junior have been compiled using QLiberator by Liberation Software.

Thanks for the memory

Ron Massey looks at the differences between permanent and temporary computer memory



Although functionally similar, computer memory chips fall in either of two distinct categories, Random Access Memory and the Read Only Memory.

The names given to the chips are a misnomer, in that both can and usually are accessed randomly. From the users' point of view, the names are used to distinguish between temporary and permanent types of memory respectively.

From the computer point of view when it is looking at the internal data flow, a program can make RAM chips behave as if they were ROM chips. It is in this way that SuperBasic extensions are added by various toolkits as if they were part of the QL native language.

To keep power supply requirements to minimum the most common type of RAM chip used is called a Dynamic RAM. DRAMs require a refresh cycle, during which time its data contents are, in a manner of speaking, re-established.

There is one important difference between the two types of chip—data content of a ROM will remain constant, whether the computer is powered up or not, and it cannot be altered without specialised equipment.

The internal structure of a ROM is similar to a very complex matrix fuse-type board, in which, during programming, individual fuses are blown, or not, to represent a digital logic 1 or logic 0.

Programs held by ROM chips, such as the QL operating system, are blown on to the chip by a special ma-

chine and are not alterable subsequently. Because manufacturers of computers and their peripherals must order ROMs in large quantities, programs destined for ROMs must be completely bug-free. It is for that reason that special types of ROM chips are used.

While a program is being developed it is common practice to use any of several types of re-programmable ROM chip. The most common type, the Electrically Programmable ROM, has individual bits set by electronic pulses and is erasable by prolonged exposure to ultra-violet light.

Early QL

The operating system of the very early QLs was programmed on this type of chip. As the ROMs progressed through de-bugging and various version releases, they were burned on to permanent ROM chips.

To prevent possible confusion with reference to ROMs and EPROMs, references to either will be used in this report interchangeably. Although there is considerable difference between the two types of device from an electronic point of view, readers should appreciate that, functionally, they serve the same purpose.

A ROM slot, located at the rear of the QL, allows users to put additional ROMs on-line, as if they were part of the native operating system. Complete sub-systems such as ICE, MICE, EPROM-based monitors such as ROMON available from TK Computerware, a number of useful toolkits, such as the QL jump Super Toolkit II, Sandy CPMulator and a

host of other add-ons can occupy this slot.

Each time the QL is re-set, it checks for ROM drivers. The availability of add-on ROMs is identified by the long-word flag 4AFB0001. If the flag is set the QL will link in the additional procedures from the ROM of the operating system. Allocated address space at 49152 to 65536 (decimal), or 0C000 to 10000 (hexadecimal), provides 16K of additional "permanent" program area from which programs usually are initialised by keywords.

Virtually every EPROM-based QL add-on available is supplied in EPROM cartridges produced by Care Electronics.

A compact and unobtrusive black box, connection to the QL is made through part of the cartridge printed circuit board which protrudes through the cartridge front edge. Fourteen tracks on each side of the PCB transfer the data to the QL.

In spite of being the most advanced home and small business micro at the time, the QL suffers a failing common with products built to a price the sockets used to connect the QL to the outside world will not withstand wear.

It is a sad fact that ROM and expansion port sockets are particularly prone to becoming unreliable if devices are changed frequently. Another problem the QL enthusiast often finds is that, with the wealth of EPROM-based programs available, frequent changes have become almost mandatory.

Taking the problem of premature failure of the QL connectors seriously, a number of solutions have been found.

One of the first adaptors providing the option of having a range of on-line EPROMs without the necessity of frequent component exchanges, the German-based company Ultrasoft produced its Multi-EPROM adaptor which is connected to the QL in the same way as the conventional Care cartridge.

The Multi-EPROM printed circuit board includes provision for installing one to six EPROM chips removed from Care cartridges. When installed, its 160mm. x 80mm. box is positioned vertically at the rear of the QL. A row of seven switches, each with an associated LED, puts selected EPROMs on-line. If a different ROM is selected the QL must be re-set, as putting a new ROM into the system mid-stream, so to speak, will always cause a system crash.

A principal weakness inherent in the design of the version of Multi-

EPROM reviewed is that its PCB connector is positioned near the right-hand side of the front face of the adaptor.

Overcoming the two problem areas of the Ultrasoft Multi-EPROM and, at the same time, adding a useful sub-system to the QL, Micro Control Systems has produced a multiple EPROM synthesiser, Multi-ROM, which uses RAM instead of ROM chips for portable storage of program data. Installing Multi-ROM requires the connection of a wire link inside the QL between the B7 terminal, in the expansion plug – the seventh pin from the front of the QL on the top row – to the right-hand terminal on the bottom row of the ROM socket. As the link is terminated at each end with miniature multimeter-type connectors, no soldering is required.

Once installed, the link provides a write-enable function enabling the

Thanks for the memory CONTINUED

QL to download data into the Multi-ROM memory; the link has no effect on standard EPROMs. The QL case is then re-assembled and the final phase of preparation, prior to Multi-ROM installation in the ROM port, can be made.

The data held on standard EPROMs must be transferred to individual files on Microdrive or disc. This is done by switching off the QL, inserting each standard EPROM – i.e., as supplied in Care or equivalent cartridges – switching on the QL and, after pressing «F1» or «F2», typing: **SBYTES drive-filename,49152,16384**

If the ROM image is different from the Multi-ROM current contents, the QL will perform a system software re-set automatically with the new keyword "WARMSTART". If the contents are the same, return to SuperBasic is made.

Several methods have been provided to enable you to perform a system re-set. A "warm-key" function converts the otherwise fatal «CTRL»«ALT»«7» key combination into a keyboard version of the Multi-ROM SuperBasic extension "WARMSTART". Either method will re-set the QL, bypassing the usual memory check.

The SuperBasic extension "RESET" performs the same function as pressing the QL re-set button; "WARM128" will re-set an expanded



QL to 128K memory. An additional facility has been provided to allow users to run EPROM-based programs from memory; "RUN-FROM" allows you to load and initialise formerly EPROM-based utilities from a drive. A typical application of this function:

100 LOAD-FROM ffp1-Toolkit-II

110 RUN-FROM ffp1-qflash

120 RUN-FROM ffp1-ProPascal

will load Toolkit II into Multi-ROM and re-boot. It will then load and initialise the Qflash RAM and ProPascal. Some position-dependent programs will not work with the "RUN-FROM" command because they expect to run at address C000.

Two programs known to fall within this limitation are Eidersoft ICE and the Metacomco C compiler, both of which will, however, run normally when used with the "LOAD-FROM" facility.

Also included in the Multi-ROM repertoire is a utility to provide a default device driver, enabling you to enter directives and filenames with

"Anyone doing serious work with EPROMs will almost inevitably eventually acquire an EPROM programmer"

minimal typing. As a safeguard, the DEL-ETE and FORMAT commands require a specified drive but a specified default drive may be used with LOAD, LRUN, EXEC, SEXEC, LBYTES, SAVE, SBYTES, COPY, DIR, OPEN and the Multi-ROM extensions LOAD-FROM and RUN-FROM. Other device-related extensions have been provided to make life a little easier: **DEVLIST [channel]** lists all the devices recognised by Multi-ROM.

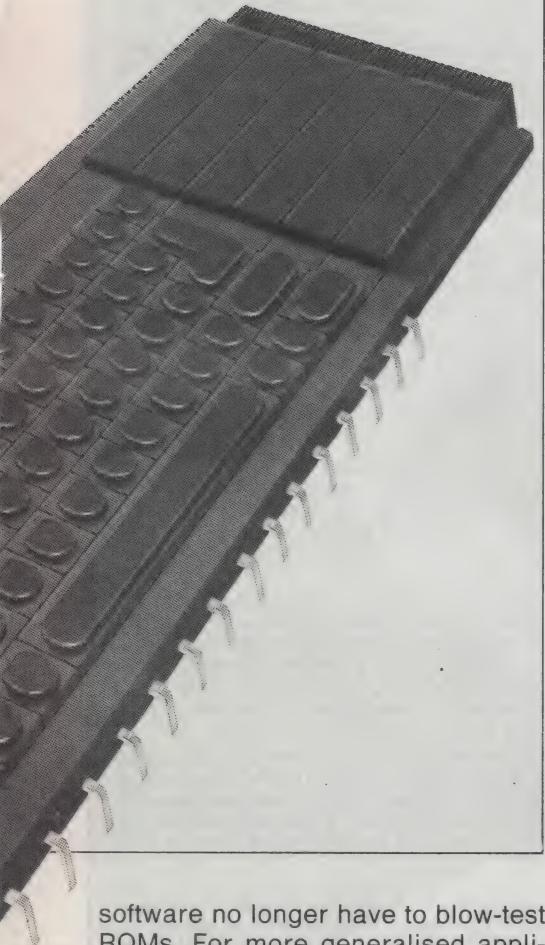
ADD-NAME name adds a new recognised device to the list of devices.

DEFAULT device name allows the default device to be changed.

defdev\$ is a function to return the current default setting.

EXIST is a function which may be used to test if a specified file exists.

Obviously, Multi-ROM provides a number of useful facilities. What may not be so readily apparent is that programmers developing ROM-based



software no longer have to blow-test ROMs. For more generalised applications, Multi-ROM provides an easy-to-use system which will, if you take advantage of the range of genuinely-useful EPROM-based software available, save considerable wear and tear on the ROM socket by eliminating the need to change EPROM cartridges constantly.

The release version of the Qflash Chip Board reflects a considerable degree of design sophistication. If you have either a standard 128K QL or internal memory expansion two Chip Boards may be connected in series through the expansion port on the left side of the QL, giving you the maximum total of additional ROM space of 256K.

If you have external memory expansion and/or a disc interface, your QL will accommodate only a single Chip Board. Your disc interface is removed from the QL, Chip Board is plugged into the expansion port and the interface is connected to the through-plug on the end of the Chip

Board.

As supplied, Chip Board is configured to accommodate three 16K user-supplied EPROMs. Users have the option of having three 64K EPROMs instead but doing so requires that the master program to be blown on to EPROM must be sent to Qflash for a modification of the file header, identifying that it is an EPROM-based program.

Anyone doing serious work with EPROMs will almost inevitably eventually acquire an EPROM programmer. Even if you have had no previous experience with a programmer, you will find QEP III exceptionally easy to use. Every attention has been paid to the smallest detail with regard to both presentation and function. Shipped in an A5 case, accommodating both operation manual and the programmer unit, QEP III is held in position to the lid by a strip of Velcro. Occupying the QL expansion port, QEP III remains resident and may be invoked with either:

EPROM or EPROM size

where size is the working area to be used by QEP III. Defaulting to 64K, working area may be altered in increments of 1K.

Complete range

This versatile and flexible programmer is suitable for the complete range of 5-volt MOS and CMOS EPROMs from 16K - 2716/2516 types - to 512K - 27512 type. Three programming voltages are provided - 12.7, 21 or 25 volts.

Protruding from the left end of the programmer, a 28-pin Zero Insertion Force socket accommodates an EPROM - either a programmed chip, which is to be copied into the QL memory, or a new chip ready to be programmed.

A two-position lever on the ZIF socket, in the "Free" position, enables a chip to be dropped into place. Moving the lever to the "Lock" position clamps the pins with the unit contacts.

In addition to selecting the type of EPROM, pinout details may also be changed, allowing you to diverge from standard pinout allocations for address and data lines. Particularly useful, this feature allows PCB layouts to be simplified by allowing PCB tracks to be laid out as convenient rather than having to adhere to chip manufacturers' standard pinout conventions. EPROM-type and re-defined pinout configurations can be saved as a file to Microdrive and may be re-loaded as required. The QEP

III user interface consists of a combined menu and command system. Options are selected either by using the cursor keys to highlight the required item and pressing either «SPACE» or «ENTER» or by pressing the first character of the item. Throughout, pressing «ESC» will abandon a selected option.

Programming may be made at all locations in an EPROM or within a defined address range.

Prior consideration

As with all computer peripherals, prospective purchasers should give careful consideration regarding their requirements prior to buying add-ons; functional compatibility with existing peripherals is important.

Typical of the consideration being referred to, to provide the user with the maximum memory expansion of 896K the Miracle Trump Card utilises the chip address from E0000 to FFFFF, allocated originally for additional ROMs, as RAM memory.

Trump Card users wishing to have on-line EPROMs should consider either single EPROMs, of the Care cartridge type, the MCS Multi-Rom or the Ultrasoft Multi-EPROM adaptor as an alternative to the Qflash Chip Board. Users with either standard 128K or up to 640K expanded systems can opt to use any of the multiple add-on systems available.

It is my feeling that the ideal arrangement for Chip Board would be with a solely Microdrive-based machine, used with internal memory expansion. That is not to say that disc interfaces/external memory cannot be used but Chip Board precludes the use of the rear extension legs supplied with the QL.

You must also take precautions to ensure that the connection of your interface will remain integral to the QL while it is powered-up; failure to do so could result in damage to the electronic components of the interface, the QL or both.

A slightly less important consideration, displacement of the disc interface card by 70mm, required by the Chip Board width will expose most of the components of your interface. In my estimation, from the point of view of ease of use, presentation and its cost-effectiveness, QEP III must receive top marks.

This deceptively unassuming tool is the finest EPROM programmer I have used. There can be little doubt that QEP III represents the epitome of state-of-the-art EPROM programmers.

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Thor User Guide

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The Thor Computer System is a professional business machine designed with the user and his future requirements in mind. Cambridge Systems Technology have developed several models making the Thor extremely versatile: the single NEC 3.5in. floppy version with or without a 20M SCSI Winchester in addition to the dual floppy model packaged in a stylish metal case. The Thor is equipped with 640K RAM, parallel and serial printer ports, battery-backed clock and a separate IBM style (PC-AT) keyboard. Supplied free with the Thor is a specially commissioned version of the award winning Psion Xchange[®] software suite and a comprehensive manual. Special features of the Thor include multitasking at a single key-stroke and enhanced screen windowing representing excellent value for money.

The Thor 20 Computer System is the newest development from Cambridge Systems Technology, the very latest in high-speed processing. Based on the Motorola MC68020 processor, the Thor 20 delivers on average three times the computing power of the Thor.

The Thor 20 package includes a suite of development software comprising a specially commissioned macro assembler by Talent Computer Systems and a linker by GST in addition to the Psion Xchange[®] business software together with full supporting documentation. The Thor 20 Computer System provides a substantially higher performance than the Thor at a very cost-effective price.

The Thor 21 Computer System is designed for 'number crunching' applications. Based on the 68020 processor and additionally incorporating the MC68881 floating point coprocessor, the performance of floating point operations are dramatically improved - taking only 1% of the time taken without the coprocessor. This system is essential for a wide range of scientific and engineering applications and only costs an additional £201.25 (inc VAT).

CST now offer a choice of monochrome or colour monitor suitable for use with the Thor range of computers. The Philips CM8833 14" colour monitor includes interface lead and screen. The Philips 7502 12" monitor has a dark anti-glare screen, horizontal/vertical size adjustment, position adjustment, brightness and contrast adjustment and a foldable foot. Both of these monitors have been selected by CST from the wide array of available monitors for their superior performance and reliability when used with the Thor computer range.

The best-selling floppy disk interface is fitted with a 16K EPROM containing many 'Toolkit' extensions, and CST's Ram Drive 2. It may be used with most 3.5 or 5.25 floppy disc drives. CST's own twin slimline double sided 80 track 3.5 units being exceptional value for money, with 720K of formatted storage per drive. The Toolkit provides a wide range of SuperBASIC commands and functions designed to improve access to the powerful facilities of the QL without the need for machine-code programming. Job control is made easier, files can be used for random access, alternative character sets can be produced, 'wild cards' can be used in file operations, etc.

The Ram Drive device driver allows free memory to be used as though it were a very high speed disc in fact the fastest such device when used with the RAM-plus. Ideally used for the storage of temporary results, or multiple screen images for animated displays, it also eases the copying of files in single disc systems. The Ram Drive can only use memory which is free, so the full advantage is only felt if the QL is equipped with additional memory. Built into QDisc 4 and Thor, the Ram Drive is also available on 3.5in. and 5.25in. floppy disc.

The CST RAM-plus unit expands the available memory of the QL to the limit of 640K. Using high grade 256K memory devices, this unit is the only one which offers the high performance of no wait-state operation. Housed in a rugged metal case, the RAM-plus unit has an expansion slot which duplicates the QL's, allowing any other CST peripheral to be used. Among the advantages derived from using the RAM-plus are the performance improvements of software and storage devices, and the ability to multitask several programs at once.

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Thor XVI Thunders Ahead

THE DEVELOPMENT team at CST are pulling out all the stops to have their XVI series ready for the new year and firm orders are already building up, adding to the pressure. The ever cautious Manufacturing Manager, Graham Priestley said: "With the hardware manufacture now entirely in-house and to our own designs, we have a much tighter grip on quality control and assurance.

"Our use of advanced but established components means maximum reliability without sacrificing performance or security of future supply."

He said that CST's main aim is to ensure that the Thor XVI is as flexible as possible. This theme was stressed at the recent QUANTA meeting in Swindon by Dansoft's Hellmuth Stuven and CST's Proprietor, David Oliver, where the design of the Thor XVI was discussed with club members.

Planned Obsolescence

Many of the questions raised were on the often thorny subject of compatibility with existing and future products. Oliver explained that company philosophy is to support existing and new customers into the future with planned growth rather than the planned obsolescence adopted by many of the high volume manufactureres.

Examples given were the continuing use of the Qdos architecture (albeit vastly enhanced), compatable hardware interfaces and continuously expandable systems; for example, a user with a humble single floppy 512K machine can upgrade in stages to a 6.5 Mb system with a winchester and two floppies and remain in the knowledge that he will be able to incorporate new features as they become available.

Prospero Deal Agreed

RENNED software house prospero have reached agreement with CST to port their Pro-Pascal and Pro-Fortran 77 compilers onto the Thor computer range.

Due for release early in the new year, the new versions are fully validated implementations of these popular languages.

Protected

To maximise ease-of-use while guarding against "piracy", the compilers make use of the Thor's unique Watermark protection system to customise each copy to one machine without needing a "master" disc or rom to be present.

Dear Hilde . . .

I want to read 5.25 inch discs for the QL or IBM on my Thor. Can you help me to do this?

Yours hopefully
Disconcerted
Tunbridge Wells



The Thor XVI shapes up

CST RAM - Plus leads the field

INDEPENDENT tests carried out by Digital precision on all leading makes of QL ram expansion show CST to be in front in the memory speed stakes. Their 512K ram almost halving the time required by the standard 128K QL from 33 to an unbeatable 17 seconds to run a test program.

This time is equalled only by the built in ram of the Thor range; figures for the Thor XVI are still under wraps but are expected to show even higher performance.

In the second edition of their TURBO ENCYCLOPEDIA Digital Precision state "We use and recommend the CST RAM Plus add-on board, which is well designed and the fastest 512K RAM we have tested."

Just for the record, the Thor 20 completes the same test in 4.5 seconds! This speed however is because the 68020 takes advantage of its high speed on-chip code cache rather than accessing RAM.

THOR TIMES AGONY AUNT

Dear Disconcerted,
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Next Month:

*Thor Ritzaus System
Delivers the News*

Back to the future

**Simon Goodwin
adopts the role of
history master in
this special review**

This article traces the history of the Psion packages, the four business programs supplied with every QL. It explains the differences between the many versions on the market, concentrating particularly on the later version 2 programs.

As with most complicated disasters, it is impossible to understand the behaviour of the Psion programs, famed for their bugs and slow speed, without knowing a little about QL development. Psion, the programmers, put in a vast amount of work on the QL packages since 1984 but most of that gallant effort was expended undoing the effects of the rushed decisions of late 1983.

The tale is not entirely gloomy, although recently Psion has forsaken the QL and concentrated on its successful yuppie electronic filofax, the Psion Organiser. Despite two years of development, the Psion *QL Flight Simulator* never reached the market but the last versions of the QL business software escaped and they include many useful new features, as well as corrections for old bugs.

I have noted the new features later and at the end I explain how you can upgrade your software.

When Sinclair demonstrated the QL to the press in January, 1984, the Psion packages were about the only QL programs which worked, or at least, appeared to work. Unfortunately that initial impression was rather misleading. Psion was a smallish London software house which had written some spectacularly successful games and utilities for the Sinclair Spectrum. Like Sinclair, it plotted a course upmarket in the mid-80s. It planned a suite of integrated business programs, individual programs which allowed data to be passed back and forth between them.

Integrated programs, or packages, were all the rage in 1983. MicroPro led the way with the *Star* family, *WordStar*, *SpellStar*, *CalcStar*, *DataStar*, *InfoStar*, *PlanStar*, *ReportStar* and so on, programs linked more by their names than their functionality. Then there was the *Easy* range, the *Perfect* package, and so on.

The Psion family was to be called *Xchange*, to emphasise from the start the way that data could be passed back and forth. In those days business programs were usually written in machine code, to get the best possible performance from limited memory and processor power, but Psion wanted to be able to move its programs between different types of computer, in particular from the QL to the IBM PC, so it wrote *Xchange* in C, a general-purpose language.

Psion software was developed on a large computer, a VAX supermini. That approach allowed the company to work on programs for many machines at once, even if some of the

target computers were not yet finished. That was just as well, as Psion still had only a card-frame prototype of the QL, with a single Microdrive, when Sinclair first demonstrated the packages.

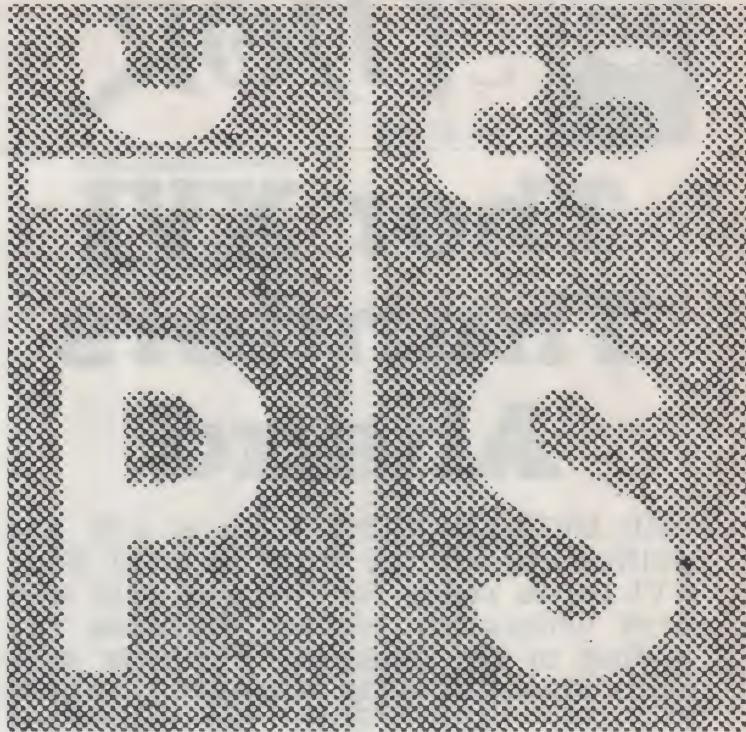
The VAX made the development of the Psion packages possible but it caused many performance and compatibility problems which made it easy for people used to simpler systems to sneer at the first QLs.

Programming in C is all very well for most of the code but it falls down when you reach the nitty-gritty pieces which talk to the hardware of a specific computer, the operating system. As I explained in the August *QL World*, the QL was meant originally to have an operating system called CP/M-68K, similar to the CP/M and MS-DOS systems used on earlier business programs.

Unfortunately, CP/M-68K needed a good deal of memory and the Psion C compiler emitted verbose code – it was not possible to fit packages and operating system together in the same QL. So Sinclair decided to replace CP/M-68K with an in-house development, – not because it was better, although it was – but because it was smaller.

Last-minute change

That last-minute change complicated things for Psion. To keep things compatible, it wrote an MS-DOS Emulator so that its C programs could pretend they were running on an IBM PC. Whenever they needed to access the hardware, the programs called the MS-DOS Emulator, which trans-



tirely re-written in machine code to make it faster and to fit all the program into memory at once, with extra space for data besides. The MS-DOS emulator remained, unfortunately.

There was much less risk of locking up the system by running out of memory and the programs loaded with EXEC, which uses the fast LBYTES routine. Sadly, they still would not multi-task because they grabbed virtually all the spare memory after loading, regardless of the capacity of the system. Nowadays you can run several packages at once but you need a front-end program such as *TaskMaster* or *QRAM* to make sure that memory is shared fairly.

Version 2 lets you select the type of ordering used in Archive and Abacus. You can choose ASCII ordering, compatible with most other computers, or pick the QL's weird but useful scheme of interleaved lower-case and capital letters. Printer and screen format configuration programs were improved but had to be converted from version 1 format.

You can configure version 2 programs to use non-standard printers and interfaces. It is also easy to tell the programs to read data and help files from disc, although the screen prompts still refer to Microdrives. Previously you needed a CST utility to convert version 1 programs to run from disc.

The new Quill was much less likely to lock up the machine than version 1 but it still had a few non-fatal bugs in its handling of the text and status displays. Inserting text starting with a Tab could cause odd results, as could deleting the last character of a paragraph or inserting a new line in certain places.

Short memory

Version 1 programs were not really suitable for serious use. File-handling was slothful and tended to crash the machine if memory was short. Problems in the duplication process made master tapes unreliable. Quill used to produce extra blank lines unless you selected 80-column display before printing.

It is not worth dwelling on the faults of version 1, except to make the point that you should upgrade them. Psion spent the second half of 1984 converting the packages to run on the ICL One Per Desk and the IBM PC. QL users continued to struggle with version 1 for almost a year before Psion revised the QL programs.

Version 2 was generally much better than version 1, although some serious bugs remained and a few new ones crept in. The code was en-

tered the IBM PC system calls into whatever that day's version of the QL needed.

The MS-DOS Emulator insulated Psion changes elsewhere in the system but the extra communication step slowed things. The compiled C program was already significantly slower than hand-crafted machine code. Even when the QL was running there was not sufficient memory to load an entire program into RAM, so the packages were set up to load routines piecemeal from Microdrive as they were required.

That was an inappropriate way to handle Microdrives, which take several seconds to get started. The drives were also slowed by the need to communicate through the MS-DOS Emulator. If reading started a moment too late the tape had to turn for seven seconds before the same block of data arrived again.

Q includes two neat tricks to speed Microdrives but the original Psion packages could not take advantage of either. Q can read binary files very fast with an 'LBYTES' operation. It reads each block from the tape and slots any part of the required file into the correct place in memory. LBYTES can usually search an entire tape in a few seconds.

Unfortunately, MS-DOS has no such facility. As the Psion programs pretend to talk to MS-DOS they must ask the Microdrive to search for each data block in strict sequence, ignoring other parts of the file they may pass en route and usually forcing many extra laps of the tape.

The other helpful feature of Qdos is

the slave block, an area of otherwise unused memory which holds a copy of parts of the tape which have been used recently. When a tape is read or written the computer does a quick check to see if it can save time by using the slave block instead. Qdos needs two free slave blocks – one on late ROMs – to work and all except the latest MG ROM can crash if they run out of slave blocks completely.

Psion filled up the memory so that slave blocks were of little use; often the first version of the packages would lock up the machine by stealing the memory needed by the Microdrive handler. Psion could not predict problems like that by running the program on its VAX.

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A last-minute improvement for version 2.0 of Quill was intended to speed data-file handling. It worked very well unless files were more than 32K long, in which case SAVE and BACKUP would invariably fail with a plaintive file I/O incomplete report.

Copying, deleting and typeface changes were made easier in Quill version 2, as you could move back if you selected too large an area accidentally. Those options still re-draw the screen over and over again, so they are still slow.

Archive 2.0 had some serious bugs. Like Quill, it could not write files of more than 32K. LOCATE and NEXT could get lost in ordered files and sometimes ORDER would fail to sequence large records correctly. ALTER worked well in version 1.01 but version 2.0 had a tendency to du-



plicate some records and delete others as it went along. Unstructured programmers could crash the machine by adding 256 lines to any procedure.

New features in Archive version 2 included the option to trace programs by pressing F3 while they run and a command to re-direct printer output to any device. New functions allowed formatted printing and direct manipulation of field names inside programs.

Version 2 of Abacus offered an extra 8K of memory for programs. It was fairly reliable but still had a tendency to get confused about the screen mode when deleting data or loading a new file.

The revised Easel was faster than version 1, had two new printer drivers and left an extra 4K for data. It could still crash if you asked it to show all possible graph formats when memory was almost completely full. Version 2.0 let you choose the scale of graphs, rather than tolerating a scale set automatically to match the data values. That makes it much easier to compare several graphs or to present misleading information, TV documentary style.

Psion patches

Psion produced patches for the most serious new bugs introduced by version 2 and they were incorporated into an interim release version 2.1. It was a vital upgrade for people hoping to process large files with Archive and Quill, although it slowed the handling of small files.

Version 2.3 was the next full release and fixed all the problems with version 2 which I have noted so far. Version 2.3 also allowed files to be transferred between packages over the QL network.

Version 2.3 adds yet more printer drivers for Easel. It copes better with curious or anxious users. It is no longer possible to lock the machine in a continuous loop by asking for Help about Help about Help.

The Quill 'Import' command is improved, in that you can choose whether to import 'by line', when each line read becomes a paragraph, or 'by paragraph', where each group of lines becomes a paragraph. Bad stylists and ungrammatical programmers, beware - Import cannot

cope with paragraphs more than about 3,800 characters long. Version 2.35 is not so different from 2.3, as the new number suggests. One pleasant feature is that repeated pressing of F3 toggles you between the two Quill Command menus. The programs no longer lock out parts of the QL memory as they run, so you do not have to re-set the machine between loading one package and another. That makes the Xchange concept a little easier to swallow, although you can manage with the earlier version 2.3 if you display the directory of every drive you intend to use before loading a Psion program.

Version 2.35 is the first to include a sensible garbage collection routine to tidy after heavy bouts of editing. Earlier versions could pause for several minutes, shuffling data furiously when tables became full and memory was short. That never happens for more than a few seconds with version 2.35.

Minor corrections

There are minor corrections in all four programs. Quill can GOTO large page numbers without problems. Archive no longer tacks extra spaces on to REM statements when you edit them. Easel can 'Kill All Figures' properly and Abacus knows how to cope with empty cells when ordering a row.

There is one new feature in Quill 2.35, an 'Export' command which lets you write a document to a file which you can LOAD subsequently as SuperBasic, VIEW, or edit with other utilities such as *The Editor* or *HiSoft DevPac*. Previously the only way to export plain text was to 'print' the document to a file, using a simplified printer definition.

Version 2 of Archive left 20K of memory for programs and internal tables on a standard QL. That was 8K more than version 1 but still rather restrictive, particularly for people selling applications programs written with Archive. One of those authors was Chas Dillon. He persuaded Psion to produce a run-time version of Archive, stripped of the program editor and command line interface.

Run-time Archive has about 34K of memory free for programs and tables on a standard QL but it will not let you type-in commands or procedures. When you load Run-time it reads and executes the Archive program in the file BOOT PRO automatically. Run-time Archive has no editor, so all programs must be saved and loaded in an internal form, rather than as text.

Version 2 of standard Archive also lets you load and save programs in the fast internal format, although the format differs for version 2 and 2.3. This new feature created a problem for the marketeers at Psion. They decided that people should have to pay to use Run-time Archive, even though it was distributed widely; many commercial programmers paid a £1 licence fee to use Run-time Archive in their database applications.

To compel people to buy the full Run-time development pack, Psion arranged that Run-time Archive should expect a non-standard internal program format. You cannot use it to run programs developed with the normal version of Archive.

People who bought the development pack needed some way to create Run-time Archive programs. The answer was Archdev, a version of standard Archive, complete with editor but zapped subtly so that it, and only it, could produce tokenised files acceptable to Run-time Archive.

One exceptional feature of Run-time Archive is a machine code call instruction. It can be used to bypass the slow Archive interpreter at key moments. Dillon has used the feature in his Archive programs and managed to speed some operations by a factor of 400.

Run-time Archive includes features which have also found their way, undocumented, into the latest versions of standard Archive. The PDQL Archive Tutor gives full details. Eleven box characters can be used to design neat screen layouts. They are available by printing character codes 225-235. When designing screens you can type those characters directly by pressing F5 followed by a letter from 'a' to 'k'.

Print styles

It is also worth bearing in mind that Archive recognises MS-DOS control codes, so you can move the cursor, select print styles and clear areas of the screen by printing sequences of IBM PC control codes.

Archive was the only program which continued in development after version 2.35. That was almost entirely due to the persistence of Dillon. Archive uses an internal index table to keep track of your data. The data is left in the drive, so it is the size of the index which determines how many records you can handle at one time.

Each record in the file uses a single slot in the index. The size of the slot depends on the number of orderings imposed on the file - a minimum

of six bytes, plus eight bytes for each ordering. So if a file was sorted by name and price, each slot would take up $6 + 8 \times 2 = 22$ bytes.

Dillon discovered that Archive used 16-bit pointers to manipulate the index, limiting the theoretical maximum size of the index to 64K. What was worse was that some of the index code used signed numbers and some used unsigned ones. Large unsigned numbers would be treated as negative or positive at different parts of the code, scrambling the index if it grew beyond 32K in size. The consequence of the 32K limit are shown in figure one.

Archive version 2.38 allows the index to grow up to 64K without prob-

lems, allowing twice as many records as previous versions. Apart from that it is the same as version 2.35. The intervening versions, 2.36

and 2.37, were unsuccessful attempts to fix the 32K index bug.

There is no way beyond the 64K barrier, so the figures in the table show the maximum number of records you can manipulate with QL Archive. Even the QL clones, the CST Thor and the ICL One Per Desk, use the same 16-bit index.

Lucky readers

If you outgrow those sizes you will need to upgrade to an IBM clone and run the MS-DOS versions of Xchange, which allows up to 65,500 records and, naturally, has no need of the MS-DOS emulator. It costs £79.35, more than some lucky readers paid for their QLs.

Psion - 01-723 9409 - can supply upgrades for all four QL packages at £9 per cartridge. So far as the company is concerned, the latest version is 2.35 for everything except Archive, where it is shipping 2.36. It has no plans to produce further versions.

The snag is that Archive 2.36 still contains the very serious 'large file' bug. Archive 2.38 was not developed until after Psion ceased production of QL software. Version 2.38 is available from Psion but you can get it from Archive applications specialists

PDQL - 021 233 3042. The price is a nominal £5. You should enclose an SAE and a blank disc or cartridge with your order.

The run-time and development versions of Archive are available together from Psion at £19.95 for the pair. Alternatively, for an extra five pence PDQL can supply the corresponding version 2.38 programs.

The development of the Psion packages epitomises the story of the QL. Many good ideas were thrown in a pot and the whole lot was emptied into a computer before it had time to gel. Almost four years later the position is very different. Psion received few thanks for its efforts - more a falling level of abuse - but now the packages are much better-suited to the QL. They leave more space for data, work faster and have few vices when used to process small files.

The packages are still rather slow, mainly because of quirks and the presence of the MS-DOS emulator, but QL suppliers offer a multitude of cures for those problems - fast expansion memory, RAM and floppy discs, The Editor, TurboQuill and Speedscreen. If you take care in setting-up your system, QL Xchange can beat packages on other computers hollow, on performance as well as price.

Figure 1.

(Label) Maximum Archive database sizes

No. of ORDERS:	0	1	2	3	4	5
Version 2.38:	18800	4600	2900	2100	1700	1400
Vers to 2.37:	5350	2300	1450	1070	840	700

The table shows the approximate maximum number of records, assuming that the QL has extra RAM. The maxima for a 128K QL are lower and depend very much on the program version, type - e.g., Archdev or Run-time - and peripherals in use.

lems, allowing twice as many records as previous versions. Apart from that it is the same as version 2.35. The intervening versions, 2.36

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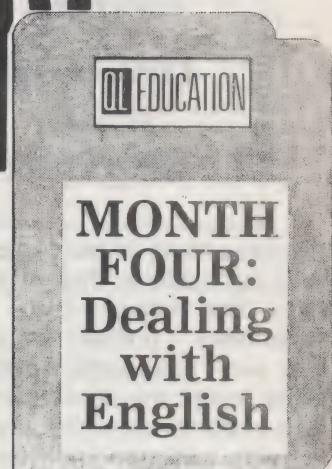
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QL EDUCATION



Leslie Fahidy looks at the teaching of English in the fourth part of his new series on education

Until now we have concentrated on the teaching of mathematics in this series; now it is time to look at the teaching of other subject areas. The most important topic, after mathematics, with which young children have to deal at school is English. All other subjects are important but mathematics and English have the central position in the educational system – the student must return reasonable results in both subjects to pursue an academic career. Young people cannot gain entry to any university course, or even most professional courses, unless they have a reasonable pass in O level mathematics and English, now to be superseded by GCSE results.

There are five areas in the teaching of English on which we must concentrate – vocabulary and spelling, grammar, comprehension, communication skills and punctuation.

Let us start with vocabulary and spelling and investigate the various techniques we may use to help young people to achieve proficiency. The aim is still the same as previously, to write computer programmes which will help the learner to acquire the necessary knowledge in this area. There is a clear dividing line between the two areas of vocabulary and spelling and our programs should reflect the fact. After all, there is a distinct difference between somebody knowing the meaning of, say, pseudoscientific and being able to spell it correctly.

Ability to spell

The level of the student also has an effect on how far we should go in separating a knowledge of vocabulary from the ability to spell correctly. If the program is intended for young

children, say in the 10 to 12 age group, it is a mistake if the child does not know whether it is "receipt" or "reciept". The 'e' before 'i' rule is important but a student preparing for his 'O' level English would not be penalised seriously for spelling psychology as psichology.

There are a number of approaches to teaching vocabulary, without taking too much notice of correct spelling; let me outline some skeleton algorithms.

1. Games of the *Hangman* type are suitable at a lower level, with the added advantage that the learning process appears to be entertaining. Correct spelling does enter the playing of games of this type but, since we would normally apply this method on the lower regions of the learning curve, the words encountered most frequently are likely to be simple and they do not usually present a spelling problem. To make a game more interesting it would be a good idea to arrange several sets of data and to use them for different levels of difficulty. The program could be written in SuperBasic, almost without regard to the vocabulary to be used and a different 'RESTORE «line»' statement incorporated, depending on the level of difficulty chosen by the student, thus presenting different sets of words.

2. An alternative approach could make use of Archive. The program could be written in SuperBasic but there is no point in going to the complications of writing a database manager in Basic, when the tools are already available in the form of a very high quality database. The program could proceed as follows – a dictionary-type definition is presented on the screen and the student is

invited to supply the necessary word. If the response is exactly as it appears in the database, entered previously by the author, the answer is accepted and the fact is acknowledged that a correct answer has been given.

Further search

If the response does not match exactly the content of the appropriate answer field in the database, a further search is undertaken which looks at all the different and commonly-made mis-spelt versions of that word. If it is found, the evaluation should state that the word was correct but the spelling was not. As a further embellishment, a list could be kept of all mis-spelt words and at the end of the session the student could be given further exercises to teach the correct spelling of all those words which have not been spelt correctly.

Needless to say, the success of this approach depends on the research which preceded the writing of the program and the compilation of the data to go with it. Not only must the vocabulary be correct, in the sense that it includes the words which the teacher intended to teach at this stage but, the most commonly-occurring spelling mistakes of that word must also be included in the data.

If the response entered by the student is not found, either as a correct spelling or one which is incorrect, the answer must be rejected and the correct answer displayed on the screen. If the answer contains a spelling mistake but is otherwise acceptable, the learner must be told that the answer was substantially correct but the spelling was incorrect.

3. Commercially-available spelling

MONTH FOUR: Dealing with English

checkers could be put to good use in teaching spelling, though not vocabulary. The scenario could be along these lines -- present a screenful of text with deliberate spelling mistakes. Invite the student to make a note of all words which are spelt incorrectly and then apply the spelling checker to the same text and compare the errors noticed by the student to those words which are rejected by the spelling checker.

There are three shortcomings to this approach. The first is that we must rely on the spelling checker being accurate and I have yet to see a spelling checker which is. Admittedly, users of the QL are in a better position than users of many other systems -- our spelling checkers are not usually written in American English.

The second shortcoming of the method is that since we cannot interfere with the software we cannot introduce evaluation of answers. All that will have to be left for the learner to deal with, which pre-supposes a certain degree of maturity. The third problem concerns the ever-present failing of all spelling checkers -- they will accept words whose spelling, though incorrect, is correct for a different word. For instance, if the intended word is 'could' and the student spelt it as 'cold', the spelling checker would accept it, since that is a correct spelling in its own right. This problem cannot be overcome until or unless we have a context checker available at a reasonable price.

Difficult problem

Teaching grammar is a more difficult problem than the teaching of spelling and/or vocabulary. Two possible approaches are:

1. Present a sentence on the screen, asking the student to analyse it and enter answers. The expected answers could be held in a data file and compared to those given by the student. Some care would have to be exercised in the writing of the program since, in most cases, there are

numerous answers which are potentially equally correct.

Suppose the question was: "What is the subject?" and the expected answer is: "Jack"; The following answers are equally correct and we must make sure that they are evaluated as such -- a, "Jack"; b, "The subject is Jack"; c, "The subject of the sentence is Jack", and no doubt you could think of many others.

The technique available to overcome such a problem is keyword searching. In this case, we would designate the word Jack as the keyword and so long as it is present, the answer is deemed to be acceptable. Such techniques, however, are not without danger. Suppose the student's answer was: "Jack has blue eyes" it, would still be accepted, since the keyword appears in it but, clearly, it is totally meaningless in context and incorrect. Only the author of the software can make up his mind how to deal with such discrepancies.

2. Present on the screen a piece of text which contains deliberate grammatical errors and ask the student to type-in the offending word(s). An extension of this method would be to ask the learner to type the corrected sentence in full.

The Chambers *Modern English Dictionary* defines comprehension as "act of understanding or of including" and that is what comprehension, as a part of English language, means.

When writing computer programs, either to teach comprehension or to test a student's ability to comprehend, we are facing the task of helping the learner to understand and put into context what has been read. We need to present text on the screen consisting of several sentences which contain relationships between the different statements and ask questions such as: "Who came in through the door?", "Why was the dog barking?", The questions have to be such that it is possible to answer them, based on the material presented. At a higher level, we may ask a question, the answer to which is not stated directly in the passage which has been read, but it may be concluded. The passage may not include a statement explaining why the dog was barking but if it stated that the dog saw a cat across the street, it may be concluded that that is why it barked.

The basic body of the program should not present great difficulties; the main problem is, as before, how to accommodate various answers,

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each of which may be correct and, equally, how to exclude answers which could not be correct. It would be possible to write the whole program in SuperBasic but there is no need to punish ourselves with such a task. The QL is complete with an excellent database manager, which is programmable as well, and we could use it to provide the solution for our problem. The command language of Archive is a revised version of a highly-structured Basic, with the facility of almost unlimited screen editing.

Permitted answers

I suggest that two data files should be used, one containing the passage and the appropriate questions, the other the permitted answers to each of those questions. A great deal of research is needed to make sure that all permitted answers are included and I would advocate the provision of facilities to enable the user to add to the 'answers' database; somebody, sooner or later, is bound to discover answers which are perfectly logical but have not been included among the allowable answers.

Further, to make the task more interesting, I would suggest the creation of several database structures to give the user a choice of which to use. Alternatively, a random number could determine which data structure should be in use. Otherwise, unless a great deal of data has been incorporated, which means an extortionate amount of work, the comprehension

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teacher would become easily predictable.

In a sense, communicating skills involve the exact opposite of comprehension. When dealing with comprehension the task was that the student should read a passage of text and demonstrate understanding of it. In communications skills, the roles are reversed. The student is presented with some facts and is required to communicate the information to a third party, without omitting any of the details or adding fictitious ones.

At the present level of computer technology, certainly within the bounds of the QL, it would not be possible to devise a program which can achieve those aims. Generating facts, from a series of pre-determined data statements, is not difficult in itself; the problem arises when we try to evaluate the responses. No computer program of which I can think would be able to read a passage entered by the student, compare it to the appropriate data, and test that all information has been included in it without distortion and that no new information has been added.

Tested by hand

That does not mean we should abandon the idea of teaching communications skills with the aid of a computer. I believe that the computer should be utilised, even if the checking of the resulting piece of communication has to be tested by hand.

The program could be written in SuperBasic, making use of READ-

DATA statements and the RESTORE «line» facility. A random number could be used in determining which block of data should be read. Apart from that, a further random number could be used to decide which of the data items read in should, or should not, be included in the task.

If each block of data contained, say, 20 facts and using random numbers we chose only five of those, the exercise could be much less predictable, without the need to enter excessive amounts of data. The student should then be presented with the items of information which must be included in a piece of written work and those pieces of information could be printed-out to present a reminder to the student, as well as a point of reference for the person evaluating it.

Whether the student prepares the answer by hand, or decides to use Quill to produce the required piece of communication, is not of major importance. I would, however, state that using a word processor has certain advantages apart from the fact that printed text is easier to read than hand-written; the world for which we are preparing children will be such that a certain amount of keyboard skill will be necessary for all who want to hold a reasonable job.

While typing is not as yet on the curriculum of most schools, particularly not at lower levels, I would encourage all school children to use a typewriter whenever possible.

I would like to make one more point concerning the teaching of communications skills. It is normal practice in most of schools that, except when dealing with spelling, spelling mistakes made in written work are more or less ignored. There are good reasons for the practice and I do not wish to criticise it; when teaching communications skills, spelling and punctuation are important.

In last month's instalment, dealing with the teaching of mathematics, I emphasised that teaching with a computer should be restricted to the lower age and ability levels. Those restrictions do not apply to the teaching of English, except for the fact that all the five topics now considered are such that writing programs at a higher level involves a great deal of effort. Bear in mind, however, that the rewards are also proportionately greater.

A number of changes have taken place recently with respect to the accepted rules of punctuation. The

changes may well be due to the punctuation used in many popular papers and have been adopted by more serious publications as well. What we must bear in mind is that, whatever the popular usage of punctuation, Examining Boards have not moved with the times and, consequently, we must teach punctuation in the old-fashioned way.

Two forms

The teaching of punctuation on the computer may take either of two forms.

1. Display a sentence on the screen without punctuation and invite the student to re-type it with the punctuation included. The evaluation of the response could be based on the same sentence, which is held in a different variable, with correct punctuation. The structure of the program could be straightforward; written in Basic, you compare two strings. If they are identical, the answer was correct, otherwise it was not.

2. An alternative method would be to display a text with incorrect punctuation and ask the student to correct it. Should you be able to think of sentences which have a different meaning, depending on the punctuation, that would present a worthwhile bonus. The structure of the program could be similar to the one in the previous case.

In both cases the program should be written without reference to the data file which holds the information and, when the program is run, the learner could be asked which data file to use. In that way not only will the test be more unpredictable but it enables the teacher to add new data files to the package.

Next month we will tackle another teaching topic, practical skills, a sadly-neglected aspect of computer education. A large number of practical skills cannot be taught on the screen of a computer but there are many which lend themselves to that treatment. Consider how many computer games you have seen which involve driving racing cars at high speed, round impossible bends. Is there any good reason why the same technique could not be used to teach young people how to drive safely and within the Highway Code?

You may have noticed that there have been no software supplements for two months. I have no good reason but the excuse is that I, too, must take time off occasionally for a holiday. I hope software supplements in Microdrive Exchange will be back in next month's issue.

ABC Electronic

Andreas Budde
Hügelstr. 10-12
D-4800 Bielefeld
West Germany

tel.: 0521/690381
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1. POINTER'S TOOLKIT

Pointer's Toolkit is intended to be a complementary toolkit for QJUMP's Super Toolkit II and/or QRAM or for Sandy's SuperQBoard with mouse. Naturally you can use it also without any of this hard software. It contains a background string-exchange command, for example, a command to kill all currently running jobs, a function which works like INPUT, but you may give a pre-defined text to edit (like the input used by PSION), a new RESPR which never returns not complete, even if there are jobs running, a monitor-save-job, and, if you have a command called POINTER or a file called PTR-IMI or PTR-KBD (from QRAM), there are commands which give you access to the pointer and real pull-down-windows from SuperBASIC!

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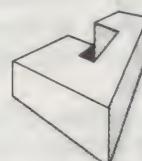
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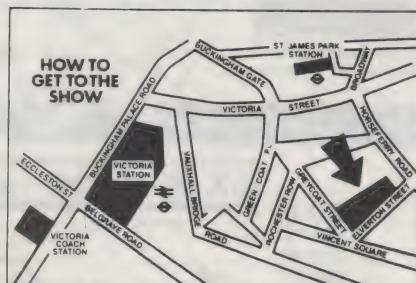
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SOFTWARE FILE

Master Warship
Grandmaster Warship
Complex Data Systems
Price £14.95 & £19.95

Warship and Grandmaster Warship are, practically speaking, one and the same game. The latter title is a souped-up mega-version featuring an extended playing area for which you will require 512K RAM. This extensive and complicated version of battleships for a computer is but one of a complete series of games, 10 in all, but with the exception of this one, not yet written by Complex Data.

Like all wargames, the objective is to win and you do that by capturing cities. All cities initially

are neutral and your tanks and troops can just roll in. Once a city is captured it can be set to work producing weapons of war to re-stock what you will inevitably lose in battle; you can even produce more troops, just like the real thing.

Although Warship initially seems to be very complicated the method of operation is straightforward and you can pick up things very quickly by playing. The introductory menu provides a beginner's game for this purpose, though I would not bother with the demonstration, which is utterly confusing.

You are provided with four fleets and each component, whether it is a submarine, an aircraft carrier, or whatever must be given instructions. A white cursor appears over the active vessel

and relevant information such as its type, armaments, location, heading and speed are displayed. As well as changing direction, various other instructions can be given. You can launch aircraft from a carrier, disembark infantry or tanks from a troop or tank carrier. The main map screen also supplies other information, including grid references, the time and date, names of vessels and positions of other ships and islands.

Attacking the enemy is carried-out in true battleships style. By occupying a square on which they are resident the QL works out the odds and you are informed whether you are the victor or a piece down. Enemy ships cannot be seen until they are close to your own; unexplored areas of territory are similarly obscure, so

a good deal of scouting around is necessary.

There is plenty to Warship and having played it for a few hours I get the impression there is much more to be discovered. It is certainly not superficial. There is more detail than I have outlined and I do not think even the most demanding strategist would be dissatisfied. The game can be played on two or more networked QLs, which opens some very exciting possibilities. Unfortunately the game suffers from amateurish production – mainly spelling mistakes and irrelevancies in the instructions – but that is something to which QL gamers have become accustomed. I am no wargame fanatic but despite being deterred initially by the complex and fussy detail, I found that Warship was well worth the effort.

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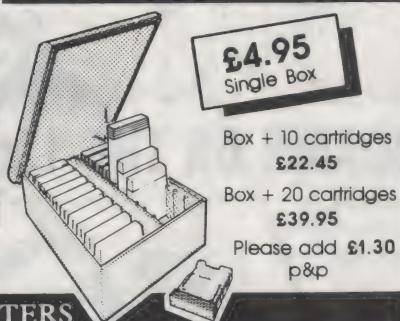
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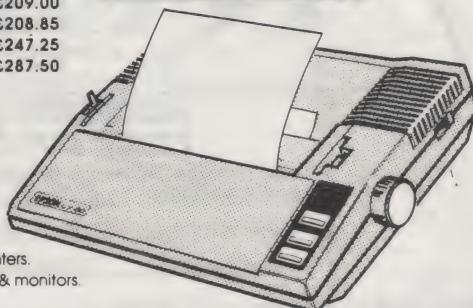
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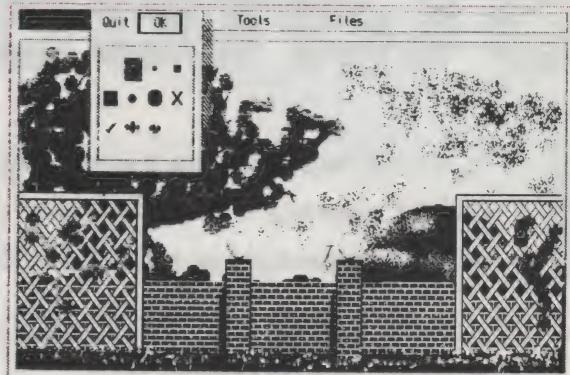
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QEP III is the "Rolls Royce" (Sinclair User) of EPROM programmers. Many QLs have been bought just to use QEP III. Programs EPROMs 2716 to 27512, NMOS or CMOS. Features high and low voltage verification. Too many facilities to describe here, it puts £1000 EPROM programmers to shame.

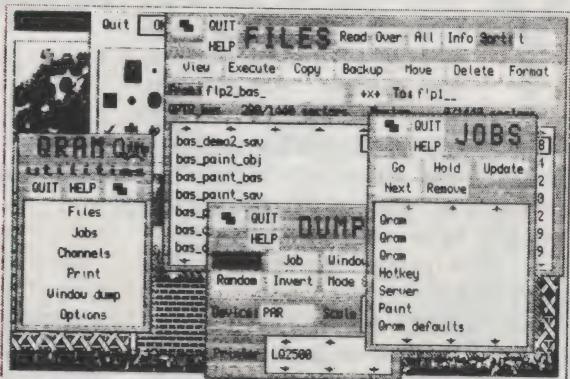
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QJUMP can supply floppy disk drivers for those who have been left with unsupported floppy disk systems. Available for Medic (gets round many of the faults on some of the early Medic disk drives) and MicroPeripherals, version 3 or version 5 (provides compatibility with the rest of the QL world and improves performance).

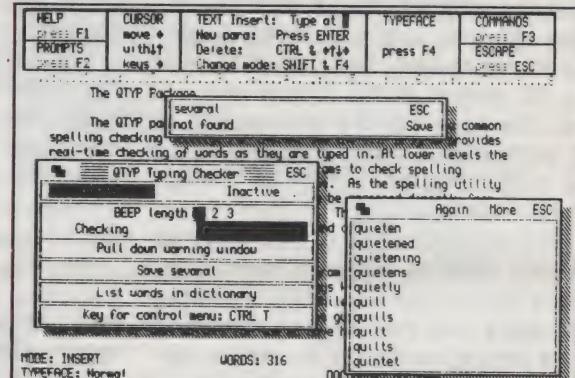
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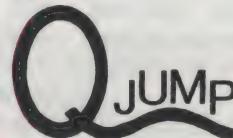


PAINT and QRAM showing FILES, JOBS and DUMP menus



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QL goes Stateside

In this article James Lucy takes a general look at the QL market in the U.S. and reviews a number of software packages from Quantum Computing

You better listen and listen good. That li'l old outfit called Big Blue sure blew it designin' that PC thing. It don' mean nuttin' that you'll find one in every office in the universe - the QL oughta be there, no bull. Qdos jus' blows MS-DOS in the dirt and y'all should be boning up hard and heavy on 68000 programming, 'fore ya get dumped in the brain-dead bin.

Or so implies Frank Toemay, the unequivocal head of Quantum Computing in the U.S. Quantum Computing contacted *Sinclair QL World* recently, offering details of its QL-related services and a number of programs for review. Before we look at the QL scene in the States and assess the New World's contribution to QL software, it is worth reflecting on the surprising popularity of the QL world-wide.

As some indication of international interest, Quanta, the independent QL users' group, has about 500 overseas members and they can be assumed to be only a fraction of the total number of overseas owners. Due in no small part to the efforts of Toemay and Tom Bent, another U.S. QL enthusiast, about 60 Quanta members may be found across the Atlantic in the U.S. and Canada. A further concentration is centred in Scandinavia and most of the northern European countries have a few tens of members each. Australia, New Zealand, India and various ex-colonial African countries seem to account for most of the rest.

Another barometer of international interest is the software written in

some countries. France and Germany either have been or are major



sources of supply of some interesting programs, ABC Electronik and Pyramide springing to mind, and *Sinclair QL World* has even contained software advertising from as unlikely a place as Ankara, Turkey.

Further afield, Vaibhav Dahake is a QL owner from the Bombay area of India and tells me of an active local computer club with several enthusiastic QL owners; they have some problems, though, among them being keyboard membranes which wilt under the combination of heat and humidity and the three-times U.K. price of most QL items. Similar problems seem to be faced by the frontiersmen QL owners of Africa.

To return to the U.S. where climatic conditions are in the main less adverse, the other enthusiast mentioned and active in the QL field is Tom Bent. He reckons that the QL market in the U.S. is small, around 3-4,000 QLs, but nevertheless was producing until recently, and probably still is, a very informative and interesting journal with the name *Quantum-Levels*. Despite his enthusiasm, he accepts that he is in IBM and Apple heartland and that the QL is likely to remain a minority machine. Not so

Toemay. Toemay also produces a remarkable catalogue for the QL, much more comprehensive and detailed than anything I have seen from the machine's native country. He offers almost every item of software available for the QL, a good range of hardware including the Futura and Thor, and even has plans to market Leon Heller's add-on Transputer board for QLs and PCs.

His style is to denigrate the architecture and operating system of the IBM 'cloneys', as he calls them, while at the same time describing the QL in terms which make me wonder if he is talking about the machine I know.

As a self-styled QL innovationist and visionary, Toemay obviously felt the need to market his own software. The programs are available in Europe from an organisation in Middlesex under the name Qmonix Code, priced between £10 and £15. What does a QL visionary produce when selecting software to publish? Let us look - and it is worth mentioning that these are pre-release versions.

Qcom Address book, £14

Not a good start for a visionary. What is the first program of which you think when you have graduated to using the filing commands in SuperBasic? Birthday list, computerised index to your record collection, or even an address book? When I tell you that this program is EXEC'd but requires the Qjump Toolkit II to be present, you should be able to guess that here we have a compiled Basic program which probably makes use of the additional filing facilities provided by the Toolkit. Suffice it to say it had the look and feel of a program developed by a home enthusiast for his edification and subsequently tidied for use by others.

The program provides a neat menu-driven environment for storing, retrieving, searching for, printing and sorting addresses.

Everything goes well until you have to enter your first address and find that addresses are in the American format. If you had designs on the State field for entering your county that is tough, because it provides only for the two-character State abbreviation. If that proves a trial, you can instead ponder what to do with the zip code.

Things are not much better when you use the program. The thing is not sufficiently error-trapped and, before you know it, there is the Q Liberator compiler error screen giving you information which is of no use, since

the SuperBasic source is not supplied.

Address book is a program which is of not really usable and in any case fulfills a function which can for most people be better served by a little pocket book and pencil. If you must have a computer version, spend a rewarding evening with Archive-filing information is what it is for.

Quantum Disc manager, £14

This program is available in a disc or Microdrive version, the disc version working only if you have two drives. Once again it requires the QJump toolkit. Effectively, the program creates a database of directory information from all your discs or Microdrive cartridges and then performs database services on it. As expected, you can search for programs and be told on which cartridge or disc they appear, you can print-out the list or you can view all files or just those on a particular disc. All work is again done through a neat menu system with moving-bar highlights, together with screen forms for input.

The disc manager imposes a filing system on you, assuming that all your cartridges are labelled from one to 1,000 and that you assign a letter to each cartridge designating the type of programs on it, U for utilities for example. It is again insufficiently error-trapped and it was not at all difficult to come face-to-face with the Q Liberator compiler error screen. This is no fault of Q Liberator, of course.

I would again question the point of this program. It is very easy from SuperBasic to list directories to a printer, or even a file, combine this with sensible labelling of discs and I suspect it would be rare person needing this kind of program.

Draw Poker, £10

This is the pick of the bunch, neat graphically with an element of addictiveness. Once again, it needs QJump Toolkit II. The game is a standard five-card draw poker, with five players. The QL will either play itself, or will compete against you while dealing the cards, keeping the score and so forth. The graphics are detailed but clear, at least on a monitor, and the speed of betting can be set to suit yourself.

Playing the computer and risking your money against the unseen faces and cards of the other players proved surprisingly addictive, certainly far more so than in the appalling fruit-machine simulations which are available.

Notwithstanding its expressionless face, the computer did not seem too good a player. Lacking ten-gallon hat, cigar and steely glint in my eye, I managed to amass a paper fortune, despite not knowing the difference between a straight flush and a U-bend. Anyway, I enjoyed it but perhaps a seasoned gambler would require more competition.

Keyboard Drill Sergeant, £10

This program could well serve as an object lesson in how to get software wrong. It purports to improve your keyboard skills but is repetitive, limited and misguided.

It is repetitive and limited because you get 10 runs at the same exercise, which consists of jabbing randomly-selected keys as fast as possible. In theory, it adjusts the speed expected of you according to your performance but in practice this was gross and insensitive.

It is misguided because it assumes that keyboard skills consist of hitting single keys sporadically and because it is so badly executed. The key you are expected to hit flashes,



making it difficult and slow to read; it is sometimes presented in the context of the other keys on the keyboard and sometimes not; silly and occasionally insulting messages appear on the screen if you fail to measure up to the program's unfathomable standards, and the whole awful experience is conducted to the accompaniment of an appalling and compulsory cacophony from the QL beeper. I think on balance this is one to avoid.

QL Kitchen aid, £14

This program is again a database written in compiled SuperBasic, this time storing recipes and recalling them at will. Designed by a professional baker and former owner of frozen food, cake and pastry production companies. We are told that "the current professional field rendition of this program, running on a QL, is controlling the entire daily production of a large baking factory located in a multi-story (sic) building located in New York City". Good to hear that it works at altitude.

It does not seem to work at sea level, though, because my copy crashed regularly; in fairness, we are told that this is a preliminary version. It does not know a flp from an mdv, nor a par from a ser, has not heard of metric units, and is difficult to use for anyone other than, presumably, the designer.

Unless you want to beat your QL with dough-covered fists, another notebook and paper job, I am afraid.

Chequebook manager, £19

Another idea which does not benefit a visionary. In the unlikely event that you want to sit at home and enter details of standing orders, cash dispenser payments, cheque payments, deposits, interest, service charges and so on, this program lets you do so and will tell you all about the entries you have made. Spreadsheets like Abacus are good at that kind of thing, too, and let you make predictions into the future.

Summing up

There is, I am afraid, a world of difference between a program designed from the outset to be a commercial product and one which has evolved from something intended for personal use. With the possible exception of Draw Poker, all the programs will serve only to reinforce the low opinion of the QL typically held by the unconverted and will therefore be counter-productive in Toemay's evangelistic campaign.

On the other hand, the QL community should be grateful that in the most important computer market in the world, the QL still has some dedicated supporters who are prepared to put money and effort behind the machine. The Quantum Computing catalogue is excellent, prices are good and from what I have heard, service rivals U.K. leaders like Qjump and Strong.

Addresses

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Tom Bent
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Quantum Computing Qmonix software from:
HB Computer Sales
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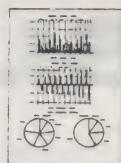
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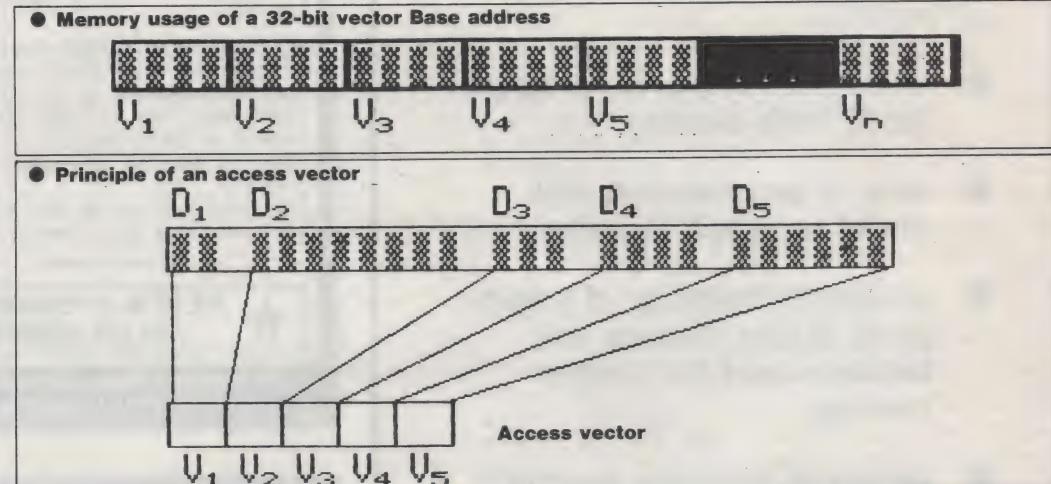
SUPER BASIC

Mike Lloyd continues his series on data handling with an examination of vectors and arrays

The only way the QL or any other digital computer can store information of any kind is by converting it into numbers and storing it in bytes of memory. Everything in a computer memory, whether it be strings, programs, character shapes, machine code routines or system variables, is all stored as 8-digit binary integers. By using a high-level language like SuperBasic, programmers are largely protected from having to consider data, of whatever type, in its raw, digital state. Such blissful ignorance can be a handicap and so this month's article is devoted to static data structures, of which arrays are the most commonly-known example.

A single byte is not a particularly useful storage medium because it can represent only 256 values. Nevertheless, it is often used as a pointer to tables of information. For instance, the command to print an ASCII character, such as *PRINT CHR\$(65)*, uses a single byte value, 65, to indicate where in the character font a particular character shape is located. The QL can also consider groups of two or four bytes, i.e., 16 or 32 bits as single entities giving maximum integer values of 65535 and more than four billion respectively.

Bytes have two essential characteristics, value and location. To appreciate the importance of both features,



consider the way the QL interprets the significance of a byte depending on where it is located in memory. In the ROM a byte might represent a machine code instruction, or an ASCII character in an error message, or be part of a symbol shape in the character font. In RAM it might represent a sequence of pixels in the screen area, the location of a file in the Microdrive map, a border colour in a channel block, part of a string in the variables area, or a reserved keyword in the SuperBasic program area. If the interpreter was not aware precisely of a byte's location the significance of its value would be lost. Such navigation errors on the part of the interpreter are a fairly common cause of system crashes.

Although a byte is the basic computer data store, SuperBasic users are more accustomed to considering variables as the irreducible minimum for data storage. When large amounts of simi-

lar related information needs to be stored, SuperBasic allows programmers to declare arrays of any variable type. The principles of data storage discussed apply equally to data held in SuperBasic arrays and data held in raw bytes, although the latter method usually uses memory more efficiently.

Variable name

Conceptually, a series of bytes and a single-dimension integer array are very similar. A variable name is merely a convenient way for a programmer to refer to a memory location, or more properly a series of locations, which store a particular value.

The relationship between locations is frequently more important than their position. That a byte is at memory address 524567 might not be so relevant as the fact that it is the fifth byte in a particular series. That

is because many groups of information, or *data sets*, have natural sequential arrangements and computer data structures are most successful when they mirror the natural patterns of the information they are holding.

Names can be arranged alphabetically, values can be arranged in ascending or descending order, data can be recorded in the order in which it was entered or the order in which it will be used, and so on.

A computer data structure needs to store the elements of a sequential data set in an appropriate order to imply the links between them. Sometimes the links are more complex and need to be included explicitly in the data structure. This month's article, though, is devoted to storage structures where a sequence is implied by the position of the elements within a data set.

The simplest form of data structure is called a *vector*.

It consists of a fixed number of similar values arranged in a single dimension; it is also known as a one-dimensional array. A vector can be created by reserving an area of memory equal to the size of a single entry *size* multiplied by the number of entries required.

The start of the *n*th entry is found by calculating $n \cdot size$. This is known as a *mapping function* or an *access algorithm* depending on whether it is used to add information to a vector or to find information within it. Figure one shows the concept of a vector.

Counterparts

Some of the algorithms shown in the text have been simplified to emphasise their essential characteristics. Because of factors such as the existence of zero elements and the need for data to occupy more than one byte of memory per element, the true algorithms can look more complicated than their pseudo-code counterparts. A number of working listings have also been included to demonstrate how the pseudo-code algorithms can be translated into SuperBasic.

If any of the three essential criteria of a vector are not met problems may arise from using a sequential storage structure and it might be worthwhile investigating some other means of holding the data. Where data naturally occupies more than one dimension, multi-dimensional structures need to be devised. That does not mean, however, that the value of each element in a vector is limited to a single number.

Perhaps the most common example of a vector is a grid reference — cf the AT statement — which has two components. These would be stored in a vector as two successive bytes, the first relating to the X axis and the second to the Y axis, and the two bytes together are considered as an indivisible whole.

All the values held in a

Figure 1

```

100 REMark : ESTABLISH A VECTOR
105 :
110 Elements = 200: REMark : No of elements
115 Size = 4      : REMark : Bytes per element
120 :
125 Base = RESPR (Size * Elements)
130 :
135 REMark : WARNING: The reserved area might
               contain spurious values, so do not
               assume that unused bytes equal 0
140 :
145 REMark : Example calls
150 :
155 POKE_L Locate (12), 586
160 PRINT PEEK_L (Locate (12))
165 :
170 DEFIne FuNction Locate (Target)
175   RETurn Base + (Target - 1) * Size
180 END DEFIne Locate

```

Figure 2

```

200 REMark : 3D INTEGER ARRAY
205 REMark Establish dimensions & reserve memory
210 :
215 Max_X = 7: Max_Y = 9: Max_Z = 6
220 Base = RESPR (Size * Max_X * Max_Y * Max_Z)
225 :
230 REMark : Locate value (2, 7, 4)
235 :
240 POKE_L Locate_3D (2, 7, 4), 513
245 Value = PEEK_L (Locate_3D (2, 7, 4))
250 PRINT Value
255 :
260 DEFIne FuNction Locate_3D (X, Y, Z)
265 RETurn Base + ( (Z * Max_Y) + (Y * Max_X) + X ) * Size - Size
270 END DEFIne Locate_3D

```

vector must be identical in type and occupy an equal number of bytes. In other words, strings and numbers cannot be intermixed and, particularly where strings are concerned, elements must all be the same length, otherwise the access algorithm breaks down. Fortunately, both real numbers and integers can be limited to a fixed number of bytes whatever their value.

Although values in a vector can change by being over-written, it is rarely convenient to insert new values. That would involve shunting down succeeding values and thus corrupting the access algorithm. Similarly, it is unlikely that adding new values continually to the end of a vector would be acceptable because they may not be properly ordered and there may not be room reserved for them.

Such inflexibility is a hallmark of static data structures — it is, in fact, what is static about them — butulti-

mately even dynamic structures such as linked lists are of finite length; inflexibility is not always an unacceptable disadvantage.

Extra Dimensions

The logical improvement to a vector is to add extra dimensions, although by doing so the term vector becomes inappropriate and the data structure is now termed an *array*. In SuperBasic, arrays are always rectilinear — a two-dimensional array looks like a rectangle, a three-dimensional array is like a cube — and can therefore be said to be composed of a number of individual vectors stacked together. The mapping functions for such arrays are very easy to establish; a vector can be doubled in length, say, by reserving memory with the formula:

$base = RESPR (size * elements * 2)$

The access algorithm to locate, for instance, the

third value in the second vector becomes:

$(2 * size * elements) + (3 * size)$

The brackets are included for emphasis. In a two-dimensional array with dimensions *max-Y*, *max-X* the access algorithm to find a location represented by the co-ordinates *Ypos*, *Xpos* would read:

$(Ypos * max-X) + Xpos$

If an additional dimension were to be added of *max-Z* elements, the formula becomes:

$(Zpos * max-Y) + (Ypos * max-X) + Xpos$

The pattern could be extended to cater for any number of dimensions.

Not all data sets fit neatly into a rectilinear mould. A mileage chart provides familiar evidence of this. It is typically a number of towns listed both vertically and horizontally with a triangular set of boxes in which the distance between each pair of towns is recorded. A square mileage chart is possible but the upper right portion of the chart would be equal to the lower left portion because a feature of our road system is that the distance from Aberdeen to Winchester is the same as the distance from Winchester to Aberdeen.

SuperBasic is of no assistance when non-rectilinear arrays are required because vectors within an array must be the same length. Space for a triangular array which for convenience allocates only one byte for each distance could be established using the following formula:

$base = RESPR (towns / 2)$

The variable *base* would then hold the start address of the reserved area of memory. Towns would be arranged in alphabetical order in a string array, their location within it identifying where in the triangular mileage array the relevant distances lay. The distance between the fourth town, Bradford, and the fifteenth town, Leeds, for instance, would be stored as the fourth element of the fif-



teenth array at location:
 $base + (15 * 15/2 + 15/2) + 4$

The part of the algorithm in brackets calculates the location of the first datum relating to Leeds. It is based on the familiar formula for finding the area of a triangle - half the base times the height - converted to represent bytes rather than units of area. The general algorithm to disclose a location (X, Y) is:

$$X * X/2 + X/2 + Y$$

The value for Y must always be less than the value for X. It is interesting and convenient that the result of the expression is always an integer.

Another useful non-rectilinear array structure is the regular, or balanced, *binary tree*. A binary tree begins at the top with a single node which has two daughter nodes, each of which has two successors, and so on, until the lowest level of the tree is reached where the nodes have no daughters. A path through the tree can be traced using boolean logic - "true, false" or "left, right" or "0,1" and so on. A binary tree with X levels must have $x \cdot 2^x$ locations and a mapping function is relatively simple. The value located at the fourth node on the seventh level could be found by calculating:

$$7 \cdot 2 + 4$$

In general, to locate element E on level L of a binary tree the mapping function is:

$$base + L \cdot 2 + E$$

Binary trees are not always regular; many nodes might be missing and there may be more levels in one part of a tree than in another part. The simplicity of regular binary trees makes

them worthwhile structures even when many of their nodes do not exist.

It would also be possible to create arrays with logarithmic dimensions, or based on a natural distribution frequency, or by using mapping functions of almost any complexity, but if such unusual arrangements of data were being handled it would be better to use non-sequential data structures.

A problem sometimes encountered is how to represent arrays consisting mostly of randomly-distributed zero elements without wasting memory. Such arrays, called *sparse arrays* or *sparse matrices*, can occur in networking and engineering problems. Zero elements typically would represent above 70 percent of the data before alternative forms of holding the information become worthwhile.

One method is to construct a bit-map to indicate where non-zero elements exist. The non-zero elements could then be stored sequentially in a vector. The access algorithm for the vector would depend on the number of ones which preceded the current location in the bit-map. A matrix of single-byte integers with 32×32 locations stored conventionally would occupy 1,024 bytes.

A bit-map of the same matrix would occupy only 16 bytes and if 200 of the locations held non-zero values a vector of 200 bytes would be required, leading to a total saving of 808 bytes. Space taken by the access functions must also be taken into account but large arrays can conveniently be compressed in this way.

Another solution might be to store values alongside their location co-ordinates in a small array - e.g., DIM Array% (200, 3) using the foregoing example. The access algorithm would involve looking at a location chosen by a rough guess and then searching round that location until the target value was found.

The methods of storing

Listing 3

```

300 REMark : Establish large data string
           with integer array as access vector
305 :
310 Stores = FILLS (" ", 1000)
315 DIM Vector% (200)
320 :
325 REMark : Hold "next free vector" in variable
330 :
335 Next_V = 1: Vector% (1) = 1
340 :
345 DEFine PROCedure Add_Datum (Info$)
350   LOCAL Start, Finish
355   Start = Vector% (Next_V)
360   Finish = Start + LEN (Info$) - 1
365   IF Finish > LEN (Stores): STOP
370   Stores (Start TO Finish) = Info$
375   Next_V = Next_V + 1
380   Vector% (Next_V) = Finish + 1
385 END DEFine Add_Datum

```

Listing 4

```

400 DEFine FUNCTion Fetch_Datum$ (Target)
405   RETurn Stores (Vector% (Target) TO Vector%
        (Target+1) - 1)
410 END DEFine Fetch_Datum$
415 :
420 REMark : Example Call
425 :
430 Add_Datum "Piece of Data"
435 :
440 PRINT Fetch_Datum$ (1)
445 STOP

```

sparse matrices cannot cope easily with situations where values change from zero to non-zero, therefore fixed-length sequential storage structures must be abandoned and a solution found elsewhere.

Longest datum

Data is rarely in identically-sized or neatly-organised packets and therefore all the vector elements must either be equal in length to the longest datum, which can waste an unacceptable amount of memory, or the data must be stored in a different fashion.

To preserve some of the advantages offered by vectors, irregular data can be stored sequentially in one array and an auxiliary vector established to hold the address of the first byte of each datum. Such address pointers fulfil all the criteria of a true vector - they are of a single dimension, they are homogenous in type and length and they can be fixed in number.

Figure two demonstrates diagrammatically how the two structures relate to each other. The additional overhead is typically two bytes per element and there is also a penalty in the extra access time required to retrieve a particular datum but those disadvantages

may well be more acceptable than those of alternative solutions to the problem.

Auxiliary vectors, also called *access vectors* or *Index vectors*, also offer advantages when string arrays have to be sorted. Because it takes time to shift large string array elements round in memory it is quicker to keep the string array in the order in which it was entered and add an access vector which can be sorted to point to the string array elements in their alphabetical order.

The next logical step is to combine the auxiliary vector and the data array into a single area of memory, so that each entry includes the address of its successor. Such structures, called *linked lists*, will be the subject of a later SuperBasic feature.

SuperBasic arrays are easy to understand, establish and use but for many applications they are not ideally-suited to the task in hand. By developing other static, sequential, data structures memory can be saved and, occasionally, access times can be reduced. These two advantages are often incompatible; memory is saved at the expense of increased access time and access times are reduced by compressing the data.

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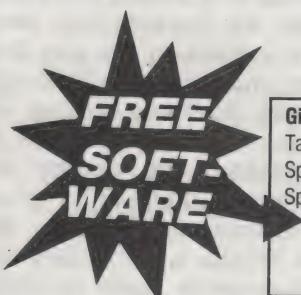
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COMPWARE

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A criticism levelled frequently at the Sinclair QL is that despite its 7.5Mhz CPU it is, in fact, a slow computer. With its tardy SuperBasic tokenising process, slow program interpretation, leisurely Psion applications and snail-like screen-handling it is not difficult to find justification for the criticism.

So far the solutions have been program-specific. SuperBasic compilers or other compiled languages are in widespread use and applications have been re-written or patched or replaced by faster but simpler alternatives.

Close study of the voluminous Turbo compiler documentation reveals that its author, Simon Goodwin, has been developing a radical solution to the fundamental problem of slow screen-handling. The finished article is the Creative CodeWorks recently-launched *SpeedScreen* which accelerates screen printing by up to 12 times. As a result, applications as diverse as Quill, Abacus, QRAM, Front Page and the SuperBasic editing environment have been given new life.

CST has already announced that SpeedScreen will appear on future Thor computers with upgrades being offered to current Thor owners. Other licensing deals are in the offing and a limited variation of SpeedScreen is being licensed to software houses. SpeedScreen will be very popular indeed.

The exceptional feature of Speed-screen is that it is a generic fix for an all-pervasive problem rather than an improvement to a specific program. It is fully-compatible with Qdos and all other programs, it is completely transparent to the user, it works in all windows, including temporary Qdos windows, it requires no special computing ability or knowledge and it imposes no limitations on the user.

Prints fast

SpeedScreen prints text in either CSIZE 0,0 or CSIZE 1,0 at least three times as fast and typically around six times as fast as normal. Window scrolling can be accelerated under user control and both cursor and CLS operations have benefitted from Creative CodeWork attention. The fix also removes the annoying flicker which appears occasionally when printing blocks or scrolling windows.

The size of the QL 32K screen map limits SpeedScreen default scrolling speed to about twice as fast as normal but SpeedScreen circumvents this restriction by allowing the user to

"Speedscreen will be very popular indeed."

Mike Lloyd reviews a well-thought-out, thoroughly tested, easy-to-use and sensibly-priced product.

Fast and

specify by how many lines the screen should be scrolled when the bottom of a window is reached.

The command -SCROLL 2, for instance, scrolls twice as far and half as often. Larger parameters are less smooth but the speed increase is dramatic. With a modest setting of -SCROLL 4 a 16K file can be copied from disc to screen in 10 seconds instead of the more normal 49 seconds.

SpeedScreen frees programmers from the limitations of the CSIZE command by allowing text sizes to be altered in steps of one pixel. Fonts based on grids of up to 8×9 pixels can be used rather than the 5×9 grid of the ROM font. Shorter characters allow more lines to be printed in a window but with some loss of legibility.

More usefully, the QL can now display conventional 8×8 fonts and its Mode 4 characters can be replaced by something more legible to TV users. The SpeedScreen package includes a variety of new fonts and an advanced character designer similar to the QLUDGE utility bundled with Turbo Toolkit. It is reasonably easy to use and the extra pixels certainly allowed the imagination more scope but the manic flashing cursor became irritating and users may prefer to write their own character designer.

Despite its power, SpeedScreen is not a cure-all and it is not without its

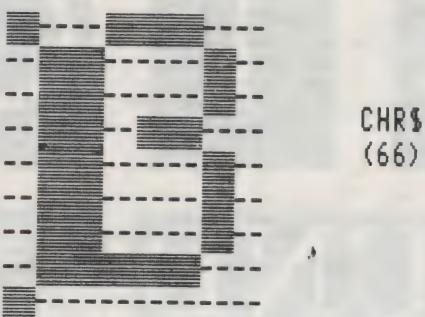
quirks. Mode 8 printing, most of the stipple patterns and all of the graphics commands are unaffected by it, although no restrictions are imposed on their use alongside accelerated characters. Underlining in non-standard character widths is disjointed but the cure would slow Speed-Screen too much to make the fix worthwhile.

Improvement

Active windows and borders are not re-drawn following mode changes but this is more of an improvement than a quirk. A few minor niggles tend to creep in when more advanced SpeedScreen features are used but they would be met only by programmers well able to cope with them.

Some programs benefit more than others from the SpeedScreen environment, due more to the way they were written than to any limitations of SpeedScreen. Quill and Abacus, noted for the priority they place on screen updating, are greatly improved; page re-drawing is much less pedestrian, operations like COPY and ERASE work quickly and the Quill over-write mode becomes almost as fast as insert mode. Keeping SpeedScreen compatible with all other software has been an uphill struggle but Creative CodeWorks believes that the vast majority of possi-

QDOS characters use columns 2-6
Speedscreen supports columns 1-6
FAT FOUNT supports all 8 columns



Press ENTER to store design, ESC to abort.

"... a handful of fonts complete the package."

friendly

ble clashes have been identified and averted. A minor but unavoidable quirk is that SpeedScreen must be loaded before QRAM.

The SuperBasic editing environment is more responsive because of the speed with which Window#2 is updated. Most impressive, though, is the way screenfuls of more than 1,000 characters can be printed almost instantaneously. SpeedScreen puts the QL into the same class as the BBC Micro for screen printing. For readers unfamiliar with the BBC, SpeedScreen literally has to be seen to be believed.

When developing SpeedScreen, the main target for Goodwin's attention was the slothful Qdos printing routine which handles all screen text, no matter what CSIZES, character designs, window shapes, border thicknesses and colour combinations are used. Its sluggishness is due to its generality; therefore the obvious cure was to trade compactness for speed and replace it with no fewer than 22 smaller routines, each handling specific printing options. The characters printed most frequently are spaces, so SpeedScreen includes a dedicated super-fast routine for printing spaces.

SpeedScreen handles each line of print as an entity, calculating all the character positions before printing starts. The Qdos code, on the other hand, is forced by its ubiquity to cal-

culate each character position individually. Even though SpeedScreen has to choose the most appropriate of its 22 routines and carry-out a series of preparatory calculations, it is still faster off the mark than the QL native printing routine. When printing begins the speed increase is phenomenal.

The fastest SpeedScreen routine works with white ink on black paper. Slightly slower routines cope with other colours and with the vertically-striped stippled. Because other stippled involve repeated changes to the printing masks they are passed to the ROM printing routine but SpeedScreen handles all UNDER and OVER options.

The calculations for locating CSIZE 1,0 characters are greatly simplified because their eight-pixel width exactly fits two bytes of the screen map. This is especially advantageous when characters begin on a word boundary in the RAM screen image. Under those conditions, even Qdos manages to improve its printing rate by some 29 percent but SpeedScreen offers an incredible 1,200 percent increase compared to the Qdos code printing "off-grid".

Representative timings are like car performance figures, that is their relevance is limited. Anyone expecting Quill to run 12 times faster, for instance, probably thinks an Austin Metro will return 75 miles per gallon

on shopping trips. Without making special arrangements to take advantage of the fastest SpeedScreen options, users can expect printing to be around four times faster on unexpanded QLs and six times faster if a memory expansion is fitted or the EPROM version of SpeedScreen is used. Carefully-chosen window positions, CSIZES and colour options will ensure the twelvefold speed increase promised by Creative Codeworks.

Simple living

Living with SpeedScreen is simple even for QL owners who know nothing about SuperBasic because it has been designed to be unobtrusive and completely compatible with everything else which runs on a QL. It can be installed as an extension alongside toolkits, front-ends and the like and then forgotten unless users wish to take advantage of the extra fonts, character sizes and scrolling options. It is very easy to take SpeedScreen for granted but omitting it accidentally from the boot sequence offers a painful reminder of what the QL used to be.

The SpeedScreen package contains a group of nine variants of the Basic code which occupy between 4.5K and 16K of memory space. Options include cut-down versions for unexpanded QLs and an extended variant to cope with very wide fonts. A comprehensive handbook, a configuration utility, a character designer and a handful of fonts complete the package.

SpeedScreen does everything Creative CodeWorks claims it does and it is practically vice-free. The package is well-thought-out, thoroughly tested, easy-to-use and sensibly priced. It has the advantage of enhancing almost every piece of software available and it does so without imposing restrictions and without requiring any computer literacy from the user. Goodwin is promising something else fast and friendly after the New Year but he may find that meeting the demand for SpeedScreen will be diverting his attention for some time.

Product:	SpeedScreen
From:	Creative CodeWorks, PO Box 1095, Birmingham B17 0EJ
For more information send SAE, or place order with cheque/PO.	
Price:	£20 for disc or Microdrive version, £30 for EPROM.

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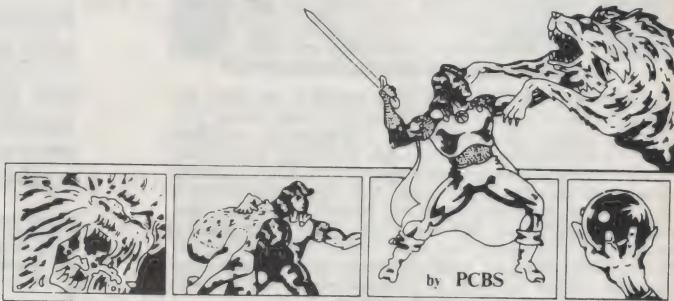
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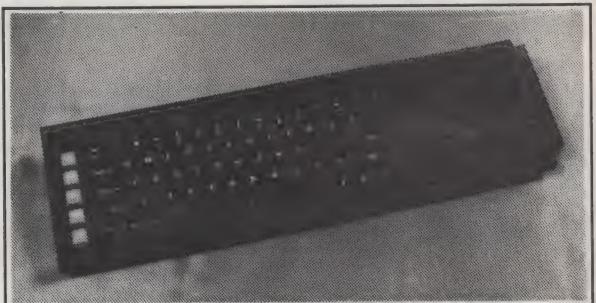
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PRIZE IDEAS

This is YOUR Focus Salespoint, so if you have any ideas about the kind of product you would like to see offered on these pages please let us know! Just pop a note into the envelope with your order form. There's a special prize for the best idea!

QL GOLD MEMBERS

Keep a close watch. There will be something special for you starting THIS MONTH with a XMAS DRAW. ALL GOLD Members ordering from this month's coupon will be entered into a free draw. The winner will receive a bumper bundle of QL goodies worth £100! Don't forget to fill in your GOLD number. The competition closes 15th January and the winner's name will be published in the next available issue.

**MERRY CHRISTMAS FROM
ALL AT QL WORLD!**

AT LAST! £6.50 THE QL SOFTWARE DIRECTORY FROM D.J.W.

In response to hundreds of enquiries from Britain and Overseas, there is now a definitive list of all the QL Software on the market and names and addresses of where you can buy it.

QL World, in conjunction with D.J.W. are offering this list on a microdrive containing quill files. There is also an update service available so that every so often you can send your old microdrive to D.J.W. and swap it for a brand new updated one. The price includes post & packing.

1.2 KEYBOARD CONTROLLER CHIP

Complete with full instructions, easy to fit, this little chip gets rid of the annoyance caused by "roll over effect" which means that when you accidentally touch an adjacent key, your target letter prints twice. If you have found this a problem in the past, then the keyboard controller chip is just what you need.
£7.50 (including post & packing)

STRESS FREE FROM A. M. T.

This month we bring you three handy attachments for your QL from A.M.T. All three have attributes in common. They are all simple and all designed to make life easier, which can't be bad!

THE THINGI (rrp £7.95) - creates working space out of thin air!

A scientifically designed copy holder which will take single sheets or bulky documents and is completely adjustable to suit your needs. The THINGI can improve accuracy and typing speed dramatically and virtually eliminates stiff necks and eye strain. Velcro fastenings make it easy to attach and remove and it virtually indestructible in normal use.

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TRIPLE-S (rrp £19.95) - stops your print-outs getting in a tangle!

A universal device that **STORES** listing paper, **SEPARATES** the incoming and outgoing paper, avoiding those annoying tangles, then **STACKS** the finished print-outs. Especially useful for long print runs which can be undertaken with the minimum of attention. **TRIPLE-S** is a totally new invention made of sturdy 3mm perspex.

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THE PLONKER BOX (rrp £4.99 - holds your working discs while not in use.)

This little box will stick anywhere on your computer or wall and holds up to four discs at once so you don't have to scrabble around looking for them!

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OVERSEAS READERS ADD £1.00 extra for postage.



PDQL Combinations

Each of the following programs work beautifully together and we are offering readers a chance to buy any TWO at a special price.



PLUS XMAS SPECIAL - DOMINATION the ultimate in Strategy Games - an addictive test of your economic and military skills for up to four players any or all of whom can be the computer. Special Xmas price £9 including P&P.

COMPARE scans 2 files displayed one above the other and highlights all differences. The unique magic panel allows you to realign and continue.

PDQL-COPY the most versatile copying program on the QL scene, provides instant reports to screen or printer on comparative sizes and copy dates from two discs or cartridges as well as other features.

X-REF is indispensable when writing large programs. Provides a full cross reference index of all keywords from your super-basic program and identifies problems caused by mis-typing, undefined assignment or unassigned definition.

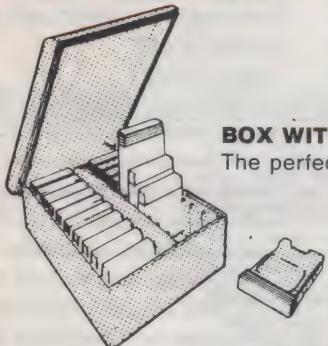
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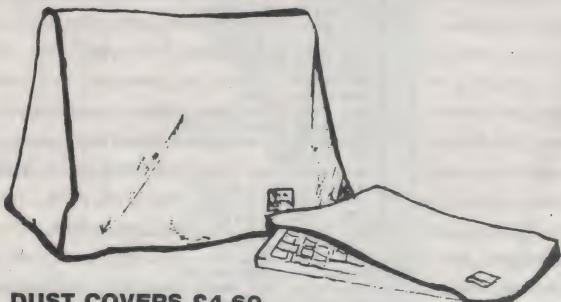


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The perfect Xmas Box for QL owners!



GOLDEN OLDIES £10

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If you have a program that is worthy of consideration, send it to 'The Progs',
Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG. We pay
for everything published at the usual page rates — £80 per thousand words.

Program of the month

SPACE PODS by SIMON QUINN

You have been put in charge to protect six fuel pods situated in the centre of the screen. Enemy ships will try to steal the pods and you must stop them by destroying

them. The ships take two hits to destroy but ramming them will kill them, as well as killing yourself.

An energy field surrounds the pods to protect them and you will bounce off it, so be careful. The game ends when

either all your fuel pods have been stolen or you have run out of lives.

To rotate the ship use the left and right arrow keys; to thrust forward use the up arrow key; to stop the ship use the down arrow key and to

fire use the space bar. To play the game, type and run the Basic Loader listing. Then, to play the game, type:
START = RESPR(11600)
LBYTES MDV1-SPACE-PODS,START
CALL START

```
60 REMark ****
70 REMark *** BASIC LOADER ***
80 REMark *** WRITTEN BY SIMON QUINN ***
90 REMark ****
100 CLS
110 RESTORE
120 start=RESPR(11550)
140 add=0
150 FOR a=1000 TO 6760 STEP 10
160 total=0
180 FOR x=1 TO 10
185 READ d
190 POKE _W start+d,d
200 total=total+d
210 add=add+2
220 NEXT x
230 READ check:IF check>>total THEN PRINT "ERROR IN LINE:":a:STOP
240 NEXT a
250 SBYTES mdv1_spacepods,start,11600
1000 DATA 17914,3978,16978,28688,29184,29696,20033
,28711,29184,B316,212682
1010 DATA 1,1,30463,29035,5114,2,1,-32669,28685,29
184,B0819
1020 DATA 29696,17402,4136,20035,28704,20035,28685
,29184,29696,17402,224975
1030 DATA 4136,20035,28716,29185,20035,28713,29186
,20035,28717,29187,237945
1040 DATA 29697,20035,10876,0,0,31232,30727,19450,
148,18938,161103
1050 DATA 304,12828,-11707,13340,-27579,30463,2869
5,20035,13432,208,80019
1060 DATA 8781,20114,-9220,0,20,20940,-30,20977,30
77,4,64683
1070 DATA 27598,28713,29191,20035,21317,30727,1945
0,90,18938,246,196305
1080 DATA 12828,-11707,13340,-27579,30463,28695,20
035,13432,208,8781,88496
1090 DATA 20114,-9220,0,20,20940,-30,28713,29188,2
0035,28717,138477
1100 DATA 29188,29696,20035,28716,29184,20035,2918
4,28711,20035,5116,239899
1110 DATA 5,1,-32669,24832,4504,3073,64,26358,2483
2,216,51216
1120 DATA 24576,-228,10,21328,16707,17696,20559,17
491,0,0,118139
1130 DATA 0,0,10,24415,24415,24415,24415,0,0
,122085
1140 DATA 0,0,10,17231,20052,21071,19539,8250,0,0
,86153
1150 DATA 0,0,15,-17219,8224,21071,21569,21573,827
5,18505,82013
1160 DATA 20480,0,10,-16864,8224,21576,21077,21332
,0,0,75835
1170 DATA 0,0,18,-16608,8224,21061,22085,21075,176
96,21576,95127
1180 DATA 21077,21332,10,21328,16707,17696,17993,2
1061,0,0,137204
1190 DATA 0,0,18,18938,21536,21328,16707,17696,215
93,4275,125648
1200 DATA 21569,21076,140,10,140,20,60,50,100,80,4
3245
1210 DATA 100,110,100,140,70,170,90,210,19529,2208
5,42604
1220 DATA 21320,18771,17231,21061,21315,20306,1766
4,17914,3516,13500,172590
1230 DATA 3,17914,3510,16978,17914,3506,17042,2918
4,30463,B316,144830
1240 DATA 1,1,28711,20035,28685,29184,29696,17402,
3684,20035,177434
1250 DATA 28704,20035,28685,29191,29697,17402,3676
,20035,28712,29184,235321
1260 DATA 20035,28695,29194,29698,20035,28679,2970
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1270 DATA 28695,12860,130,29698,20035,28679,29703,
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1280 DATA 28695,12860,320,29698,20035,28679,29701,
17402,-128,20035,187297
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1310 DATA 29696,30208,30720,31232,31744,32256,1285
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1320 DATA 200,3137,360,27382,17914,3342,13441,2918
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1330 DATA 9404,100,100,17914,3324,13500,9,17914,33
18,13500,79883
1340 DATA 2,17914,3312,16978,17914,3308,16978,1791
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1350 DATA 17914,3306,17042,17914,3342,13500,220,-2
5138,32256,17402,97758
1360 DATA 4004,18938,3900,18426,3103,13432,286,201
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1370 DATA 18426,3098,13432,286,20114,18426,3088,18
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1380 DATA 28688,17914,3286,16986,20936,-4,28688,17
914,3310,16986,154706
1390 DATA 28686,-4,17914,3266,13692,30,28,17914,32
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1400 DATA 100,28,17914,3350,13500,240,13692,110,2
13692,62628
1410 DATA 256,4,13692,110,6,13692,272,8,13692,110,
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1420 DATA 10,13692,240,12,13692,100,14,13692,256,1
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1430 DATA 13692,100,18,13692,272,20,13692,100,22,2
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PROGRESS

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2390 DATA 284, 16993, 28680, 20114, 28694, 20114, 28893,
20114, 28899, 20114, 212899
2400 DATA 17914, 1218, 12858, 1244, 13370, 1232, -7350,
-28904, -19886, 26182, 18686
2410 DATA 12858, 1196, 13370, 1194, 13884, 34, 24832, 206
6, 12858, 1180, 83474
2420 DATA 13370, 1178, 14394, 1142, 17476, -11196, 13884
36, 24832, 2042, 77158
2430 DATA 17914, 1154, 16890, 1158, 16978, 16976, 17914,
116, 21350, 17914, 129344
2440 DATA 1138, 16978, 17914, 1134, 16978, 17914, 1132, 3
154, 1, 26112, 102455
2450 DATA 32, 17914, 1122, 3154, 1, 26112, 20, 17914, 1106
21, 21330, 88705
2460 DATA 3154, -1, 26112, 6, 13500, 35, 17914, 1090, 3154
1, 164965
2470 DATA 26112, 70, 16890, 1096, 19024, 27406, 17914, 10
6, 3154, 18, 112752
2480 DATA 26112, 50, 24586, 17914, 1054, 19026, 26112, 38
1, 16890, 1048, 132830
2490 DATA 16796, 13432, 284, 16993, 28680, 20114, 28893,
20114, 13114, 1044, 159644
2500 DATA 28680, 20114, 28692, 20114, 28899, 20114, 1791
4, 1002, 19026, 26368, 210923
2510 DATA 192, 17914, 950, 19026, 26112, 182, 17914, 994,
3154, 1, 86439
2520 DATA 27496, 17914, 952, 19026, 26368, 162, 12858, 96
4, 23361, -19846, 109255
2530 DATA 944, 27138, 148, 1601, 10, -19846, 932, 27392, 1
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2540 DATA 940, 23361, -19846, 920, 27136, 122, 1601, 10,
-19846, 908, 15306
2550 DATA 27392, 110, 17914, 922, 21330, 16890, 892, 1704
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2560 DATA 16796, 16890, 874, 16976, 28689, 18426, 1104, 2
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2570 DATA 1618, 10, 24642, 17914, 868, 16978, 12858, 884,
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2580 DATA 30208, 24832, 1658, 16890, 866, 17040, 17914, 8
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2590 DATA 846, 16978, 17914, 860, 13500, 36, 17914, 784, 1
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2600 DATA 17914, 918, -11014, 842, 13500, 1, 12858, 760, 1
9009, 26112, 80900
2610 DATA 68, 12858, 794, 1089, 14, -19846, 768, 27136, 52
1, 1601, 24534
2620 DATA 28, -19846, 756, 27392, 40, 12858, 768, 1089, 14
-19846, 3253
2630 DATA 742, 27136, 24, 1601, 28, -19846, 750, 27392, 12
17914, 55733
2640 DATA 748, 21842, 24576, 74, 12858, 684, 19009, 26112
1, 116, 12858, 11887
2650 DATA 730, 19009, 26368, 106, 12858, 690, 23361, -198
46, 718, 27136, 91130
2660 DATA 92, 1601, 10, -19846, 706, 27392, 80, 12858, 666
23361, 46923
2670 DATA -19846, 694, 27136, 66, 1601, 10, -19846, 682, 2
7392, 54, 17943
2680 DATA 17914, 612, 13500, 36, 17914, 602, 21330, 28695
29269, 29698, 159570
2690 DATA 30463, 8316, 1, 1, 20035, 13432, 206, 12858, 5/6
20114, 106902
2700 DATA 17914, 632, 17042, 17914, 622, 16978, 20085, 17
914, 630, 21074, 130805
2710 DATA 3154, 46, 27424, 16978, 12858, 588, 13370, 586,
30249, 24832, 130806
2720 DATA 1460, 28689, 18426, 822, 20032, 17914, 566, 170
2, 20085, 12858, 137895
2730 DATA 558, 13370, 556, 13882, 578, 24832, 1428, 28689
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2740 DATA 20033, 20085, 17914, 488, 21074, 3154, 46, 2746
0, 16978, 12858, 140090

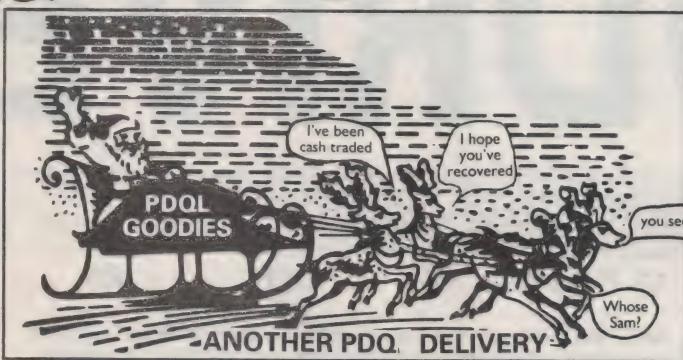
4710 DATA -32768, 2, -32768, 1, -32768, 0, -32768, 0, 0, 0, -131069
 4720 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4730 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4740 DATA 0, 96, 0, 62, 0, 33, -8192, 16, 7168, 8, -809
 4750 DATA -4096, 4, -32768, 5, 0, 3, 0, 1, 0, 0, -34851
 4760 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4770 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 48, 48
 4780 DATA 0, 44, 0, 19, 0, 16, -8192, 8, 4096, 8, -4001
 4790 DATA -2048, 5, 0, 5, 0, 2, 0, 2, 0, 0, -2034
 4800 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4810 DATA 0, 0, 0, 0, 0, 0, 0, 0, 32, 0, 24, 56
 4820 DATA 0, 22, 0, 17, 0, 8, -16384, 8, 8192, 8, -8129
 4830 DATA -2048, 9, 0, 6, 0, 4, 0, 4, 0, 0, -2025
 4840 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4850 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 12, 20
 4860 DATA 0, 10, 0, 9, 0, 8, -16384, 8, 8192, 8, -8149
 4870 DATA 4096, 9, -2048, 10, 0, 12, 0, 0, 0, 0, 2079
 4880 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4890 DATA 0, 0, 0, 0, 0, 0, 0, 0, 4, 10, 14
 4900 DATA 0, 9, 0, 17, 0, 16, -32768, 16, 16384, 16, -16310
 4910 DATA 8192, 35, -24576, 4, 28672, 46, 12288, 0, 0, 0, 0, 12415
 4920 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4930 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4940 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 4950 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 4970 DATA 0, 15, -8192, 48, 6144, 192, 1536, 256, 256, 256,
 511
 4980 DATA 256, 512, 128, 512, 128, 512, 128, 512, 128, 512,
 3228
 4990 DATA 128, 512, 128, 256, 256, 192, 1536, 48, 6144, 15,
 9215
 5000 DATA -8192, 0, 0, 0, 0, 0, 0, 0, 0, 0, -8192
 5010 DATA 0, 0, 0, 31, -4096, 32, 2048, 192, 1536, 128, -129
 5020 DATA 512, 256, 256, 256, 256, 256, 256, 256, 256, 256,
 2816
 5030 DATA 256, 128, 512, 64, 1024, 48, 6144, 15, -8192, 0, -1
 5040 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5050 DATA 0, 0, 0, 0, 0, 7, -16384, 24, 12288, 32, -4033
 5060 DATA 2048, 64, 1024, 128, 512, 128, 512, 128, 512, 128,
 5184
 5070 DATA 512, 128, 512, 64, 1024, 48, 6144, 15, -8192, 0, 2
 55
 5080 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5090 DATA 0, 0, 0, 0, 0, 0, 15, -8192, 16, -8161
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 9504
 5110 DATA 1024, 32, 2048, 24, 12288, 7, -16384, 0, 0, -96
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 5120 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5130 DATA 0, 0, 0, 0, 0, 0, 1, 0, 14, 15
 5140 DATA -8192, 16, 4096, 32, 2048, 32, 2048, 32,
 2192
 5150 DATA 2048, 24, 12288, 7, -16384, 0, 0, 0, -2017
 5160 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 5180 DATA -16384, 8, 8192, 16, 4096, 16, 4096, 16, 4096, 8,
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 5190 DATA 8192, 7, -16384, 0, 0, 0, 0, 0, -8185
 5200 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5210 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5220 DATA 0, 7, -16384, 8, 8192, 8, 8192, 4, 16384, 3, 16414
 5230 DATA -32768, 0, 0, 0, 0, 0, 0, 0, 0, -32768
 5240 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 5260 DATA 0, 0, 0, 3, -32768, 4, 16384, 4, 16384, 3, 14
 5270 DATA -32768, 0, 0, 0, 0, 0, 0, 0, 0, 0, -32768
 5280 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5290 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5300 DATA 0, 0, 0, 0, 0, 1, -32768, 3, 0, -32768
 5310 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5320 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 5340 DATA 2048, 8, 2048, 8, 2048, 0, 2048, 15, -2048, 8, 619
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 5350 DATA 2048, 8, 2048, 8, 2048, 8, 2048, 0, 0, 0, 8224
 5360 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5370 DATA 0, 0, 0, 0, 0, 7, -32768, 4, 1744, 4, -1009
 5380 DATA 1024, 8, 1024, 8, 2048, 15, -30720, 8, 50720, 8, 4
 143
 5390 DATA 2048, 16, 2048, 16, 4096, 16, 4096, 16, 4096, 0, 16
 432
 5400 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5410 DATA 0, 0, 0, 0, 0, 3, 0, 2, -4096, 4, -4087
 5420 DATA 3584, 4, 512, 8, 1024, 12, 1024, 19, -14336, 16,
 8133
 5430 DATA 12288, 32, 4096, 32, 8192, 0, 8192, 0, 16384, 0, 4
 9216
 5440 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5450 DATA 0, 0, 0, 0, 0, 1, -16384, 2, 12288, 2, -4091
 5460 DATA 3072, 4, 512, 12, 1024, 11, 2048, 16, -14336, 16,
 7621
 5470 DATA 12288, 32, 8192, 64, 8192, 0, 16384, 0, -32768, 0,
 12384
 5480 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5490 DATA 0, 0, 0, 0, 0, 16384, 0, -20480, 1, -4095
 5500 DATA 3072, 2, 512, 4, 256, 10, 512, 12, -31744, 32, -27
 327
 5510 DATA 26624, 64, 4096, 0, 8192, 0, 16384, 0, -32768, 1,
 22593
 5520 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5530 DATA 0, 0, 0, 0, 0, 0, 16384, 0, 12288, 0, 20480
 5540 DATA -14336, 3, 1024, 6, 512, 25, 256, 96, -31232, 128,
 -43518
 5550 DATA 22528, 0, 8192, 0, 16384, 1, -32768, 2, 0, 0, 1433
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 5560 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5570 DATA 0, 0, 0, 0, 0, 0, 0, 0, 14336, 0, 14336
 5580 DATA -15360, 3, 512, 13, 512, 48, -32512, 192, -32000,
 0, -78592
 5590 DATA 1956, 0, 12288, 0, -16384, 3, 0, 4, 0, 0, 15367
 5600 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5610 DATA 0, 0, 0, 0, 0, 0, 0, 0, 3072, 0, 3072
 5620 DATA -3072, 3, 512, 61, 512, 192, -32512, 0, -32512, 0,
 -66816
 5630 DATA 17152, 0, -1024, 3, 0, 12, 0, 0, 0, 0, 16143
 5640 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5650 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5660 DATA 7880, 7, -7880, 121, 512, 1, 256, 1, 256, 0, 1154
 5670 DATA -32512, 0, -32256, 3, -4096, 28, 0, 0, 0, -6550
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 5680 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5690 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5700 DATA 0, 127, -512, 0, -32256, 0, -32256, 0, -32256, 0,
 -97153
 5710 DATA -32256, 0, -32256, 63, -512, 0, 0, 0, 0, -64961
 5720 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5730 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 60
 5740 DATA 0, 3, -4096, 0, -28928, 0, -32512, 0, -32512, 1,
 -98044
 5750 DATA 512, 1, -7880, 63, 7880, 0, 0, 0, 0, 0, 576
 5760 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5770 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5780 DATA -32768, 0, 24576, 0, -20480, 1, 256, 1, 256, 114,
 -32652

5790 DATA 512, 15, 512, 0, -3072, 0, 3072, 0, 0, 0, 1039
 5800 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5810 DATA 0, 0, 0, 0, 0, 0, 0, 0, 12, 0, 3, 15
 5820 DATA 0, 0, -4096, 0, 19456, 0, -32256, 76, -32512, 25,
 -49287
 5830 DATA 512, 6, 1024, 1, -31744, 0, 26624, 0, 6144, 0, 256
 7
 5840 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5850 DATA 0, 0, 0, 0, 0, 4, 0, 3, 0, 0, 7
 5860 DATA -16384, 0, 8192, 0, 24576, 64, -26624, 33, 1536,
 26, -8581
 5870 DATA 256, 4, 512, 3, 1024, 0, -14336, 0, 12288, 0, -249
 5880 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5890 DATA 0, 0, 0, 0, 0, 2, 0, 1, 0, 0, 3
 5900 DATA -32768, 0, 16384, 64, 12288, 32, 10240, 16, -153
 60, 11, -9093
 5910 DATA 512, 6, 256, 1, 1536, 0, -26624, 0, 24576, 0, 263
 5920 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5930 DATA 0, 0, 0, 0, 0, 0, 0, 0, -32768, 0, 16384, 0, -16384
 5940 DATA 8192, 64, 8192, 32, 12288, 16, -14336, 19, 1024,
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 5950 DATA 1024, 2, 512, 2, 1536, 1, 6144, 0, -8192, 0, 1029
 5960 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 5970 DATA 0, 0, 0, 0, 0, 0, 16384, 0, 16384, 32, 32800
 5980 DATA 8192, 32, 8192, 16, 4096, 16, 12288, 11, -12288,
 12, 20567
 5990 DATA 2048, 4, 2048, 4, 1536, 2, 30720, 3, -32768, 0, 35
 97
 6000 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6010 DATA 0, 0, 0, 0, 0, 0, 0, 0, 8192, 0, 8192, 16, 16400
 6020 DATA 8192, 16, 4096, 8, 4096, 8, -2048, 15, 2048, 8, 619
 439
 6030 DATA 2048, 8, 1024, 4, 1024, 4, 1536, 7, -16384, 0, 30
 95
 6040 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 6060 DATA 2048, 8, 2048, 8, 2048, 8, 2048, 15, -2048, 8, 619
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 6070 DATA 2048, 8, 2048, 8, 2048, 8, 2048, 15, -2048, 0, 618
 3
 6080 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6090 DATA 0, 0, 0, 0, 0, 0, 4, 0, 1024, 4, 1036
 6100 DATA 1024, 8, 1024, 8, 2048, 15, 2048, 8, -2048, 8, 414
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 6110 DATA 2048, 16, 2048, 16, 4096, 16, 4096, 1, -8192, 0, 4
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 6120 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 6140 DATA 512, 6, 512, 8, 1024, 12, 1024, 19, -14336, 16, -1
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 6150 DATA 12288, 32, 4096, 48, 8192, 15, 8192, 0, -16384, 0,
 16479
 6160 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 6180 DATA 0, 4, 512, 12, 1024, 11, 2048, 16, -14336, 16, -10
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 6190 DATA 12288, 32, 8192, 88, 16384, 6, 16384, 1, -32768,
 0, 20607
 6200 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6210 DATA 0, 0, 0, 0, 0, 0, 0, 0, 16384, 0, -32768, 1, -16384
 6220 DATA 0, 2, 0, 4, 256, 11, 512, 16, -1536, 32, -14527
 6230 DATA 1024, 64, 4096, 48, 8192, 12, 16384, 2, -32768,
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 6240 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 6260 DATA -32768, 2, 0, 4, 26, 256, 97, 1536, 192, -30655
 6270 DATA -26624, 32, 24576, 16, -16384, 11, 0, 4, 0, -18
 369

6280 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 6300 DATA -32768, 2, 0, 13, 0, 48, -32768, 192, -32000, 64,
 -9721
 6310 DATA 19456, 32, 28672, 33, -32768, 22, 0, 8, 0, 0, 1545
 5
 6320 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6330 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 14336
 6340 DATA -16384, 3, 0, 62, 0, 193, 0, 65, 0, 32, -16029
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 -33503
 6390 DATA -32768, 32, -28928, 39, -4096, 24, 0, 0, 0, 0, -65
 97
 6400 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6410 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6420 DATA 0, 127, -1024, 64, -32768, 64, -32768, 64, -32768,
 64, -98945
 6430 DATA -32768, 64, -32768, 127, -512, 0, 0, 0, 0, 0, 0
 6440 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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 6460 DATA 0, 35, -512, 32, -32768, 32, -32768, 65, 0, 65, -6
 5819
 6470 DATA 0, 113, -8192, 15, 7680, 0, 0, 0, 0, 0, -384
 6480 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6490 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6500 DATA -32768, 32, 28672, 64, 19968, 64, -32768, 128,-
 32768, 249, -49127
 6510 DATA 0, 7, 0, 0, -4096, 0, 3072, 0, 0, 0, -1017
 6520 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6530 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6540 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6550 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6560 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6570 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6580 DATA -16384, 32, 8192, 64, 8192, 128, 2228, 96, -317
 44, 25, -8871
 6590 DATA 0, 6, 0, 1, -32768, 0, 24576, 0, 6144, 0, -2041
 6600 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6610 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6620 DATA -32768, 48, 16384, 64, 12288, 32, 26624, 17, -31
 744, 10, -9045
 6630 DATA 512, 6, 0, 1, 0, 0, -32768, 0, 16384, 0, -15865
 6640 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6650 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6660 DATA 8192, 96, 8192, 32, 12288, 32, -14336, 19, 2048,
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 6670 DATA 1024, 2, 512, 0, 1, 0, 0, -32768, 0, -31227
 6680 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6690 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6700 DATA 8192, 32, 8192, 16, 4096, 16, 12288, 11, -12288,
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 6710 DATA 2048, 4, 2048, 4, 1024, 2, 0, 2, 0, 0, 5132
 6720 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6730 DATA 0, 0, 0, 0, 0, 1, -8192, 30, 8192, 16, 47
 6740 DATA 8192, 16, 4096, 8, 4096, 8, -30720, 15, -30720, 8,
 16439
 6750 DATA 2048, 8, 1024, 4, 1024, 4, 1024, 4, 0, 0, 5140
 6760 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6770 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 6780 DATA -32768, 0, 24576, 0, -20480, 1, 256, 1, 256, 114,
 -32652

100 REMark --- Demo of Character Write Routine ---
 110 REMark --- By M.J.Wheeler ---
 120 MODE 4
 130 WINDOW 512, 256, 0, 0
 140 PAPER 0
 150 CLS
 160 REMark
 170 LET String\$="SINCLAIR"
 180 FOR Loop=1 TO 8
 190 z String\$(Loop), 4, 0, 7, 0+Loop*54, 5
 200 END FOR Loop
 210 REMark
 220 BLOCK 407, 150, 54, 37, 2
 230 LET String\$="QL"
 240 FOR Loop=1 TO 2
 250 z String\$(Loop), 17, 0, 7, 0+Loop*128, 53
 260 END FOR Loop
 270 REMark
 280 BLOCK 407, 60, 54, 190, 4
 290 LET String\$="WORLD"
 300 FOR Loop=1 TO 5
 310 z String\$(Loop), 3, 0, 7, 0+Loop*79, 203
 320 END FOR Loop
 330 REMark
 340

Christmas Greetings



DIGITAL PRECISION WOULD LIKE TO WISH EVERYONE HAPPY CHRISTMAS AND A FUN FILLED NEW YEAR



Seasonal Greetings to all QL readers for Christmas and the New Year
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QJump thank you for your support in 1987 and look forward to supporting you in 1988.



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MICRODRIVE

THE PROGRAMS

Author	Language	Program Name	Price
1. Giles Todd	B	DIY Assembler	£5

Featured in the March to June 1985 issues of *QL User*, this complete two-pass assembler will assemble all 68008 code and support the assembler directives DRG, END, EQU, DC and DS.

2. Richard Cross	A+O	Mini Monitor	£3
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Using approximately 3K of RAM, this handy utility will multi-task on your QL, leaving plenty of room for other programs. Commands include dumping registers, memory — and ASCII — machine code trace, register store, memory move, memory store — byte, word and long — and jumps. Featured in *QL User*, October 1985.

3. A Didcock	B	Connect4	£1
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A SuperBasic version of the classic four-in-a-row game where counters drop down slots in the vertical board. First printed in *QL User*, September 1985.

4. Shergold	B	Golf & Tose	£2
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With up to 50 courses of varying difficulty, lakes, rivers, bunkers and trees, this is a fine golf simulation. You decide the power and direction of each stroke, striving for a birdie, eagle or even an albatross. Your scorecard may be saved. This program was printed in the May 1985 issue of *QL User*.

5. Williams	A+O	Paladin	£5
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& Holliday
Written completely in machine code, this excellent *Space Invaders* game was the basis of our games programming series, started in April 1985.

6. Richard	M+B	Sprite Animation	£2
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This contains two programs from the April 1985 issue. The first is a SuperBasic multi-coloured sprite designer. The second contains machine code routines to animate the sprites on the screen.

7. Steve Deary	B	Pacman	£1
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A well-written maze game from the March 1985 issue. Almost 20 screens of increasing difficulty, including an invisible maze, make it a very versatile rendition of the arcade favourite.

8. Andy Carmichael	B	Family Tree	£3
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Based on an article in the August 1985 issue, this is an Archive program and database for setting-up and displaying large family trees.

9. James Lucy	L	Composer	£3
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Completed in *QL User*, October 1985 this QLiberated program will allow you to compose, play and amend your own melodies. The program will handle sharps, vary tempo, and even specify staccato and legato playing styles.

10. Matthew Capp	B	Miners	£2
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This interesting simulation, printed in the August 1985 issue, puts you in the role of the NCB, buying and selling coal and mines, hiring and firing miners, and raising or decreasing wages to match economic forces. The object is to be profitable but inexperienced players will find it difficult even to remain solvent.

11. P J Smith	B	DIY Adventure	£1
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From the February 1985 issue, this skeleton program requires you to slot in the details to create your own adventure programs.

12. R Green	B	Othello	£1
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This classic board game, printed in *QL User*, August 1985, can be played by one or two players. The display uses a 3D representation of the board. Average response time by the computer opponent is about 15 seconds.

13. S J Ackers	S	Touch Type	£4
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This program consists of a 13-lesson course for typing-in letters, words and phrases, a 700-word vocabulary, an interactive keyboard display and a fingering chart has more than 30K of code. Scores are displayed based on the time and accuracy of typing. A reduced version of the program was printed in the August 1985 issue.

14. Rob Sherratt	A+O	Fcopy	£4
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The first part of this program was printed in the March 1986 issue of *QL World*. The program is an ultra-fast, general-purpose file spooler.

15. Alan Prior	B	World Map	£2
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From the March 1986 issue, this program will draw a full-screen, multi-coloured map of the world for geography buffs.

16. J M Dower	B	Mushyman	£2
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Printed in the June and July 1986 issues, this provides speedy SuperBasic arcade action as you munch your way round the screen.

17. Tony Quinn	S	CAD QL	£4
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CAD design programs are particularly suited to the QL. This version from the September 1986 issue includes features such as rubber-banding and a user-definable symbol library.

18. Stuart Campbell	M+B	Attack of the	£3
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Typical science fiction horror arcade action as yet more nasties descend on harmless QL owners. Featured in the October 1986 issue of *QL World*.

19. Karl Jeffery	M+B	Starport 2001	£3
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Fast machine code action in this November 1986 version of the *Galaxians* arcade game.

20. Marcus Jeffery	S	QL Go	£4
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The oriental game of Go is so complex that even mainframe programs are easily beaten by novice players. To the best of our knowledge, this 15x15 version from the April and May 1986 issues is the only one available for the QL.

21. J P Hartley	B	Britain	£2
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Another program for geography buffs from the November 1986 issue of *QL World*. This is a round-Britain geography quiz.

22. K BG Judson	B	Darts	£2
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Program of the Month from December 1986. This popular pub pastime requires good hand and eye co-ordination to stop a moving cursor on the on-screen board.

EXCHANGE

KEY **B** = SuperBasic
A+O = Assembler and Object Code
M+B = Machine Code and Basic Loader

A+B+O = Assembler and Basic Loader and Object Code
S = Supercharged
L = QLiberate

23. Neil Taylor S Window Designer £2

This useful routine from the February, 1987 issue allows you to design your SuperBasic windows using the cursor keys. It creates a one-line procedure which, when merged into your program, will re-create that window.

24. J F Tydeman S Design 3D £4

Published in the March and April 1987 issues, this program will allow you to produce 3D screen designs with the minimum of fuss and aggravation.

25. D Carmona B Stellaris £4

Program of the Month from June 1987. This is an extensive real-time space adventure game against the computer, including economic simulations, lunar landing and superb graphics.

26. Robert Noble A+B+O Video Effects Box1 £3

These machine code SuperBasic extensions allow you to manipulate your screens, save and recall them from memory and clear them in interesting ways. Program of the Month for July 1987.

27. H R Pendry B Pontoon £3

A graphic version of the classic card game. You play against the computer. Features include changing banker on royal pontoons, accurate betting, five card tricks and so on. Printed in the July 1987 issue of *QL World*.

28. Kenneth Cameron B Picture Puzzle £2

This short but interesting program from the July 1987 issue sets up an 8x8 sliding block puzzle with on-screen graphics. You can select sliding numbers or load your own picture to solve.

29. Peter Etheridge B Bridge £4

An excellent version of this popular card game. Features include accurate computer bidding, automatic or manual play, replay hands, correct scoring, save and load positions and much more. Essential for card enthusiasts.

30. Charles Gerrard B Psycho £4

We must apologise but we have had to remove this program temporarily from microdrive exchange. People who have sent orders will have their money refunded and details will appear as soon as the program is again available.

31. B Otridge B Crossword £5

Sold originally as a commercial program, this is the perfect aid for crossword fanatics. The program provides access by word length to a dictionary of about 12,500 words, to help solve those elusive crossword clues. Note: This program requires two Microdrive cartridges.

32. Phillip Sproston B Advent2 £4

SuperBasic arcade adventure with a humorous slant. A variety of rooms, robots and problems will keep you on your toes. Full instructions included.

33. Leslie Fahidy B Clock £3

This is a complete version of the clock program, described in the June and July 1987 issues of our *QL Education* series. An on-screen clock can be used to set or read the time.

34. E. Bamber QL Con- version/ Calculator £2

Comprising weights and measures units conventions and reverse Polish calculation, this excellent utility will convert almost anything to anything. Completely menu-driven, it is very easy to use.

35. John Wakefield B Qwhist £3

Our August 1987 Program of the Month. It is an excellent implementation of the classic card game, Whist. Designed for one player (south) who partners a computer hand (north) against the computerised east and west opponents.

36. Stanley Sykes B Mail Merge £1

This cartridge contains very handy utilities providing a mail merge and labeller for Quill files. The cartridge includes a simple demonstration.

37. P.G. Ives B The Double £4

A large strategy game in which you manage a football team through the four league divisions. The program features buying and selling, team line-up, morale, and so on, through the full league and F.A. Cup season. The cartridge includes full instructions Quill document showing how to play the game.

38. Leslie Fahidy B Education £2

As part of our series of educational programs, this is designed to help teach the solution of simple linear equations. It is aimed specifically at the 11-plus age range.

39. J F Tydeman S Design 3D £4

Featured in the March, 1987 issue, this extensive program includes a large suite of graphics and filing utilities for the production of 2D and 3D graphics. It is supplied complete with instructions in the form of a Quill document.

40. Santiago Rubio B Roulette £3

Our September, 1987 Program of the Month, this is an excellent Spanish/English version of the traditional gambling game. It also includes the Leigh Pattern, a system to break the bank.

41. Leslie Fahidy B Money £2

Continuing with our series of educational programs, this one sends you on a shopping expedition, calculating prices from shopping lists and trying to determine what coins you will receive as change.

42. Neil Davidson A+B+OLife £2

A machine code version of the classic simulation of a colony of living cells which survive, reproduce or die according to mathematical rules. Quill instructions included.

See over page for order form.

43. Alan S Qsquidge £2

Glassbrook
Ian Swinton

An arcade hunt through an 8x8 grid expandable series of rooms for the necessary nine parts of Squidge's rocket. October, 1987 Program of the Month.

44. David Marsh B Compress £2

Compress is a utility to compress SuperBasic program files into a more compact form without losing the structure of the program. That uses less storage space and means slightly faster loading.

45. Ronnie M+B SuperBreak-out £2

A fast machine code version of the classic wall game where, using a bat and ball, you must try to break through the wall of bricks. Special features include optional double bats and/or balls.

46. Norman Marks B Navigator £2

To calculate the distance and direction for travel between longitude and latitude positions on the Earth. The program includes an expandable list of cities or points can be input manually. The calculation formulae can be seen from within the program.

47. Richard B 3D Maze £2

Clements

Chase round the generated maze, shown in three dimensions, searching for the key to the next level before going through the exit. Extra points can be gained by passing over Point Squares but do not be carried away because it is all against the clock.

48. Jason B Yahtzee £2

Price

The November, 1987 Program of the Month was this version of the popular dice game. The on-screen graphics make the two-player program particularly enjoyable and easy to use.

49. Charles B FileBound £3

Dillon

A November, 1987 special for *SpellBound* owners. This extension allows users to utilise their *SpellBound* dictionaries on existing files. An additional feature allows new words to be added to the dictionary. A compiled version is available from PDQL.

50. Jay B Bank £4

Lewington

This well-written, menu-driven program will allow you to keep track of a number of bank accounts, including credits and debits, dated standing orders, printed statements and much more.

51. A B Perspective £1

Didcock

Space is big. This program aims to prove it, with a graphical guided tour of the earth, the solar system, neighbouring suns, galaxy and the whole of creation.

52. Simon M+B Space Pods £3

Quinn

This 100 percent machine code arcade game was our December, 1987 Program of the Month. Your lone ship must protect six central energy pods against marauding aliens.

53. S M B Graphic Writer £2

Walker

Featured in our December, 1987 issue, this is a graphic design program with a difference. In addition to all the usual design commands, your completed picture can be saved as a series of SuperBasic commands for use in your programs.

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PO Box 74, Tonbridge, TN12 6DW.
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54. L Miles M+B Zapman £3

This fast-action, machine code game is of the classic *Pac-Man* genre. Variable skill levels and a wide variety of maze formats will keep your interest high.

55. Alan B Adventure £3**Pemberton Playtime**

An extensive adventure where you must complete tasks for the inhabitants of a strange and unusual land. A Quill document gives details of the possible commands and some help in the form of a series of coded messages.

56. Paul M Space £3**Mckinnon Invaders**

A very fast, very challenging version of what must be one of the best-known arcade games. Includes Quill instructions, ugly descending aliens and protective shields.

57. Timo B Spelled £3**Salmi**

A complete spelling checker at a very cheap price. The system works on Quill .lis files, checking them against its dictionary of somewhat more than 7,500 words. The dictionary can be expanded automatically as new words are found. This program requires a 512K expansion and occupies two Microdrive cartridges. Quill instructions are included.

58. Nigel B Radar £2**Ford**

As Control, you must monitor a radar, watching the skies, acknowledging aircraft, scrambling jets to intercept UFOs and, if necessary, lining your sights on and shooting down enemy aircraft.

59. Geoffrey B Dungeons £4**Evelyn**

As Wizard, Mega-Hero, Super-Hero or Elf, you must explore the *Dungeons*, fighting monsters and collecting treasure in this expansive one- to four-player game. Requires two Microdrive cartridges.

THE ALL-NEW MICRODRIVE EXCHANGE

Microdrive Exchange has always been a popular feature of *Sinclair QL World* and, in our constant efforts to improve the magazine, we are expanding the Exchange to bring you even more quality programs at budget prices.

To achieve those results we have altered the format of the Exchange. Rather than calculating the number of sectors required by each program and sending the appropriate number of cartridges, we have now made it a one-program, one-cartridge system. So if you would like, say, four programs, then, regardless of length, you will need four cartridges.

There are a number of advantages to the system. First, the service will be much faster, because programs can be copied in advance. Second, rather than having to ensure having the article for documentation, we will be able to supply Quill documents on the Microdrive, if needed, for future programs.

Finally, for all new programs on the Exchange, rather than just receiving the machine code version, the Supercharged version or whatever, we will be able to supply assembly listings, hex loaders and original SuperBasic versions on the same cartridge, so that you can look at and amend programs.

Naturally, this service will require the transfer of more than the usual number of Microdrives but bear in mind that the number of Microdrives you send will be returned with the software. We have reduced the price of Microdrives to £2 per cartridge.

With the new system, we have started to include programs which have not necessarily been featured in the magazine, either because they were too long or because we already had too many listings. Consequently we are now looking for quality programs of any length to feature in Microdrive Exchange. If you have any programs which you feel are good enough, please send them for review. The address and details for program submission is given in The Progs.

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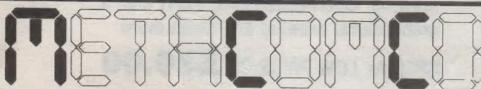
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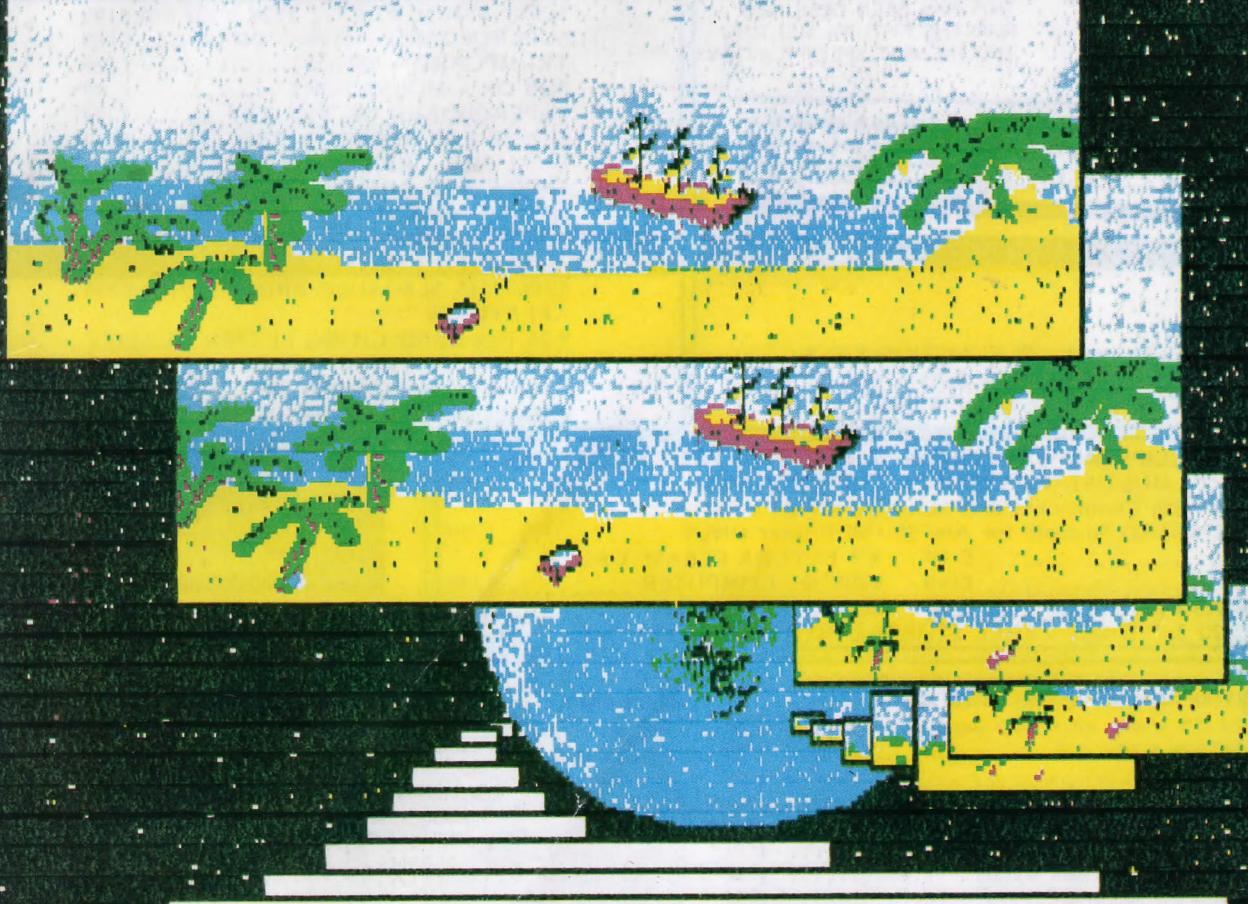
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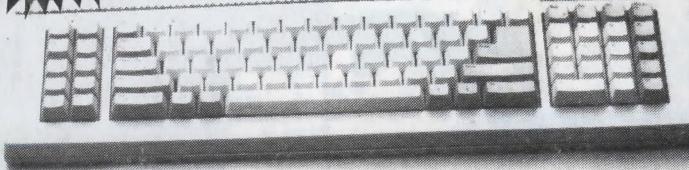
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